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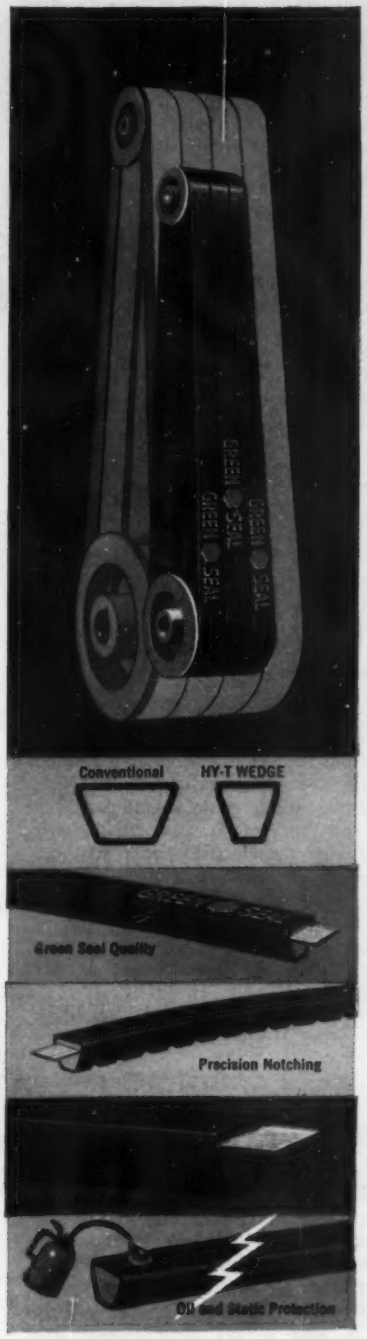

• ***economical***–*cuts drive costs up to 20%* • ***compact***–*saves up to 50% in space* • ***powerful***–*fewer belts deliver equal horsepower*

It's just what you'd expect from the Goodyear specialists who pioneered and patented the first wedge-type V-Belt in '48!

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For full details, check with the G.T.M.—Goodyear Technical Man—through your Goodyear Distributor. Or write Goodyear, Industrial Products Division, Lincoln 2, Nebraska, or Akron 16, Ohio.

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'ROUND ABOUT

with the editors in field and office

Edited by R. L. Marinello

Plant Engineer Promoted

George H. Murphy, plant engineer at the B. F. Goodrich Company's Miami, Oklahoma, tire plant for the past eight years, has been appointed superintendent of maintenance and construction for the company's Akron plants.

He joined the company in 1933 as a supervisory trainee and served in a number of positions at Akron before going to Miami in 1951.

Underground Tank Leakage

LEAKAGE FROM underground tanks can present a number of headaches to an industrial plant. That is why it is so important that proper methods of installation are understood and practiced.

Helpful information regarding tank installation is incorporated in the booklet, Leakage from Underground Flammable Liquid Tanks. The booklet covers the proper methods of installing underground flammable liquid tanks, minimizing losses, detecting leaks, protecting contaminated areas, detecting sources of seepage and other features.

The 20-page booklet, NFPA No. 329M, is available from the National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass., at 50 cents per copy.

Transistor Fundamentals

WITH TRANSISTORS playing a more important role in control equipment each day, many readers will want to get a copy of the 64-page handbook, Understanding Transistors.

Beginning with a concise discussion of the properties of germanium, the opening sections of the book clarify important basic theory and provide a solid foundation for the succeeding chapters. Subjects covered include: Atoms and Molecules, The Germanium Atom, Electrons and Holes, Current Flow, Junction, Drift and Tetrode Transistors, Transistor Oscillators, and many others. Transistorized circuits, with a detailed explanation of each, are also included.

This handbook is available from Allied Radio Corporation, 100 N. Western Ave., Chicago 80, Illinois, at 50 cents per copy.

Insulation Information Center

AN INSULATION Information Center, for consultation by industry on insulation characteristics, application techniques and specifications, has been established by the newly formed National Insulation Manufacturers Association at 441 Lexington Avenue, New York 17, N. Y.

The service will be in charge of John M. Barnhart, association executive secretary, and Raymond C. Parlett, who has just been appointed technical adviser and chairman of the association's Technical and Research Committee.

Prime reason for this center is to give industrial and commercial users of insulation up-to-date information about all insulating materials.

Hoist Specifications

RECOMMENDED minimum standard hoist specifications have just been compiled as a guide to industry.

The booklet is concerned with hoists of the electric wire rope type. It defines and spells out the recommended minimums of hoist construction and outlines basic information that should accompany any inquiry sent to a hoist manufacturer or distributor.

Copies of this booklet are available from the Hoist Manufacturers Association, Inc., One Thomas Circle, Washington 5, D. C.

Standard on Polyethylene Pipe

A NEW EDITION of the commercial standard for polyethylene pipe has just been published. The new standard includes added tests, more informative markings, and provisions for more advanced methods of manufacture.

It also covers requirements and tests for material, workmanship, di-

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by the 15th of month to make the change effective with following month's issue. Published monthly and accepted as a controlled circulation publication at Chicago, Ill.

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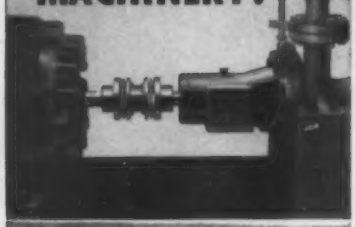

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'ROUND ABOUT

mensions, tolerances and weights, working pressures, field pressure, incremental pressure, sustained pressure and environmental cracking for pipe in three series of wall thicknesses.

Copies of this standard, designated Flexible Polyethylene Plastic Pipe, CS197-59, may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. at a cost of 10 cents a copy.

Plant Engineer Promoted

N. W. Morelli has been appointed works manager of the Allis-Chalmers Works in Pittsburgh to succeed **D. G. McArn** who is planning retirement after 39 years of service.

He joined the company in 1950, following his graduation from Oregon State College with a bachelor of science degree in mechanical engineering.

He served in various engineering and manufacturing capacities with the company before being named plant engineer in 1953. In 1955, he was transferred to the Terre Haute works as manager of plant engineering. Three years later he was appointed superintendent of transformer assembly, which position he has held until his present appointment.

Packaging and Materials Handling Service

FOLLOWING THE business trend that relates the importance of the package with the product, American Laboratories is now accepting packaging and materials handling test work.

If you are interested in availing yourself of this coordinated packaging, handling and shipping service, write to American Laboratories, Division of American Electronics, Inc., 1025 W. Seventh St., Los Angeles 17, California.

Safety Manual

RECOGNIZING SAFETY as essential to its employees, quality production and efficient operation, American Viscose Corporation has published a safety manual which it is issuing to all plant personnel.

Starting with a discussion of accident prevention, the manual treats such subjects as in-plant personal protection, emergency care and machine accidents. Illustrations further emphasize the written matter on safety. The last two pages cover 10 basic safety practices which set down fundamental rules to be followed in making safety a watchword all the time, anywhere you may be.

If you would like a copy of this manual, write to Industrial Relations Department, American Viscose Corporation, 1617 Pennsylvania Blvd., Philadelphia 3, Pa.

Moisture Protection For Concrete Slabs

HOW MUCH MOISTURE protection is needed for concrete slab construction systems? This and a number of other questions were studied by the Building Research Advisory Board and their findings are now available in booklet form.

This committee set out to develop authoritative answers regarding the nature and degree of moisture protection needed for concrete slab construction systems on or below grade and for foundation walls enclosing habitable spaces, as well as the service life expectancy of vapor barriers used with slab construction.

The report considers the fundamentals of moisture behavior in soils, insulation, concrete and flooring. It also draws attention to the sources of moisture, especially the seepage of surface water through foundation walls.

This booklet, entitled Protection From Moisture for Slab-on-Ground Construction, may be obtained from the Printing and Publication Office of the National Academy of Sciences, National Research Council, 2101 Constitution Ave., Washington 25, D. C., at a cost of $1.50.

How To Write a Technical Book

IF YOU CAN write a good business letter, you have all the literary ability needed to write a good technical or professional book, according to the F. W. Dodge people. To help get the matter straightened out in your own mind, they have published a 50-page manual, Writing and Publishing Your Technical Book.

Many of our authors who have contemplated such an endeavor will find the book helpful. It tells the potential author how to organize and develop ideas. It answers a great many questions about the author-publisher relationship, and it also presents many practical checklists on how to gather data and methods to employ in preparing material for publication.

If you would like to have a copy of this book, write to Dodge Books, F. W. Dodge Corporation, 119 W. 40th St., New York 18, N. Y.

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Snap-Tite couplings take up less space, prevent the possibility of leaking valves, save time and money in installation and maintenance. Ask your local Snap-Tite representative how much you can save by using Snap-Tite couplings.

SIZES: ¼" to 6" in aluminum, brass, steel and 303 and 316 stainless. Larger sizes and other metals on special order.

For more information, write for Snap-Tite Catalog #58. Ask for the name of your local Snap-Tite representative.

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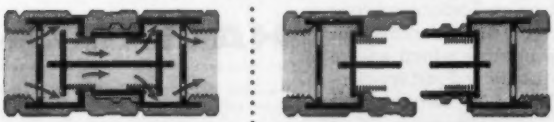

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Hall Industrial Water Report

VOLUME 7 NOVEMBER 1959 NUMBER 6

How Will It Come Out?

Industrial water softeners of many types are daily turning out millions of gallons of treated boiler feedwater. Usually the softener effluents are of good quality, meeting chemical specifications and suitable for the intended use. But things can go wrong both mechanically and chemically, and close control is essential to make sure the water "will come out all right."

Hall Laboratories engineers are thoroughly familiar with water softening procedures and equipment. They can serve you not only in setting up, but also in maintaining the routine control necessary to make your equipment operate efficiently. And they can help you determine the cause of trouble when, for no obvious reason, effluent quality is poor.

Coagulant Aid Helps Softening

The hot lime soda—hot zeolite water softener at a western paper mill functioned satisfactorily until demand pushed flow rate up to and beyond the capacity of the unit. Then more sludge was carried out of the sedimentation tank in the lime soda-treated water than the filters could handle. Some went on to the hot zeolite softeners, seriously fouling the ion exchange material. Excessive backwashing was necessary.

Hall engineer L. Arnold considered how he might hasten settling of precipitated sludge in the sedimentation tank. He recommended the use of a Hagan coagulant aid because this represented the quickest and probably most effective move.

Results were impressive. Soon after the aid was added to the lime and soda ash chemical tank the settled water cleared up. The plant operators enthusiastically pointed out that there was less suspended material in the water going to the filters than there had been previously in the effluent coming out of them.

Hardening Condensate

An automobile parts manufacturing plant prepares boiler feedwater in a hot-process softener. There are two sections in the equipment, one for deaeration of condensate and one for heating and lime-soda softening of makeup. The softened water is filtered and combined with the deaerated condensate.

The operators watched water conditions carefully and operated without trouble for some time. Then one day they were puzzled by unprecedented difficulty in maintaining reserve phosphate in the boiler water. Wishing to solve the problem as quickly as possible they called Hall engineer D. W. Whiteside.

When Whiteside arrived at the plant the operators reported to him their observation that the normally clear boiler feedwater was turbid. The turbidity was quickly determined to be sludge from the softening section of the hot process unit. Further checking showed that the sludge was in the deaerated condensate while the treated, filtered makeup water was clear.

Now it was obvious that something was wrong inside the softener, permitting treated water from the softening section to get into the condensate section. Subsequent inspection revealed partial plugging of the downflow pipe through which treated water flowed from the primary softening zone to the settling chamber. Water level rose high enough in the primary softening zone to spill the treated water over the baffle separating this from the condensate section.

A good cleaning of the downflow pipe corrected the trouble. Routine cleaning during regularly scheduled shutdowns was established to avoid future difficulty.

Care of Ion Exchange Resins

Exchange resins are expensive. A running check on performance is important in setting up cleaning and replacement programs which assure maximum useful life and put replacement cost on a uniform annual basis thus avoiding sudden major replacement expenditures.

Plant operators should carefully watch the relationship between raw water composition and gallons of water treated between regenerations of cation exchangers. A noticeable drop in capacity can give early warning of the need for cleaning.

Gradual increase in pressure drop across a cation bed is an indication that the material is becoming dirty or is starting to break down. This information should be used in conjunction with service capacity data to check condition of the resin.

Crosslinkage checks are desirable about once per year for small cation units and twice per year for large units. If caught in time, breakdown can sometimes be retarded by treatment of the water with sodium sulfite or sulfur dioxide.

The condition of anion exchange material is best watched by observing the amount of dissolved solids removed per cubic foot of resin per cycle.

Rinse requirement is important too. Increase often means deterioration or fouling. The observations may be used alone or together to determine the need for cleaning or replacement.

Hall engineers can help you set up and maintain routine testing and regeneration programs as well as the longer term checks on performance. Furthermore, Hall Laboratories is well equipped and staffed to do special work on resin capacity, crosslinkage and experimental cleaning.

Water is your industry's most important raw material. Use it wisely.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information on how the Hall System can help you solve your particular water problems, write, wire or call address below.

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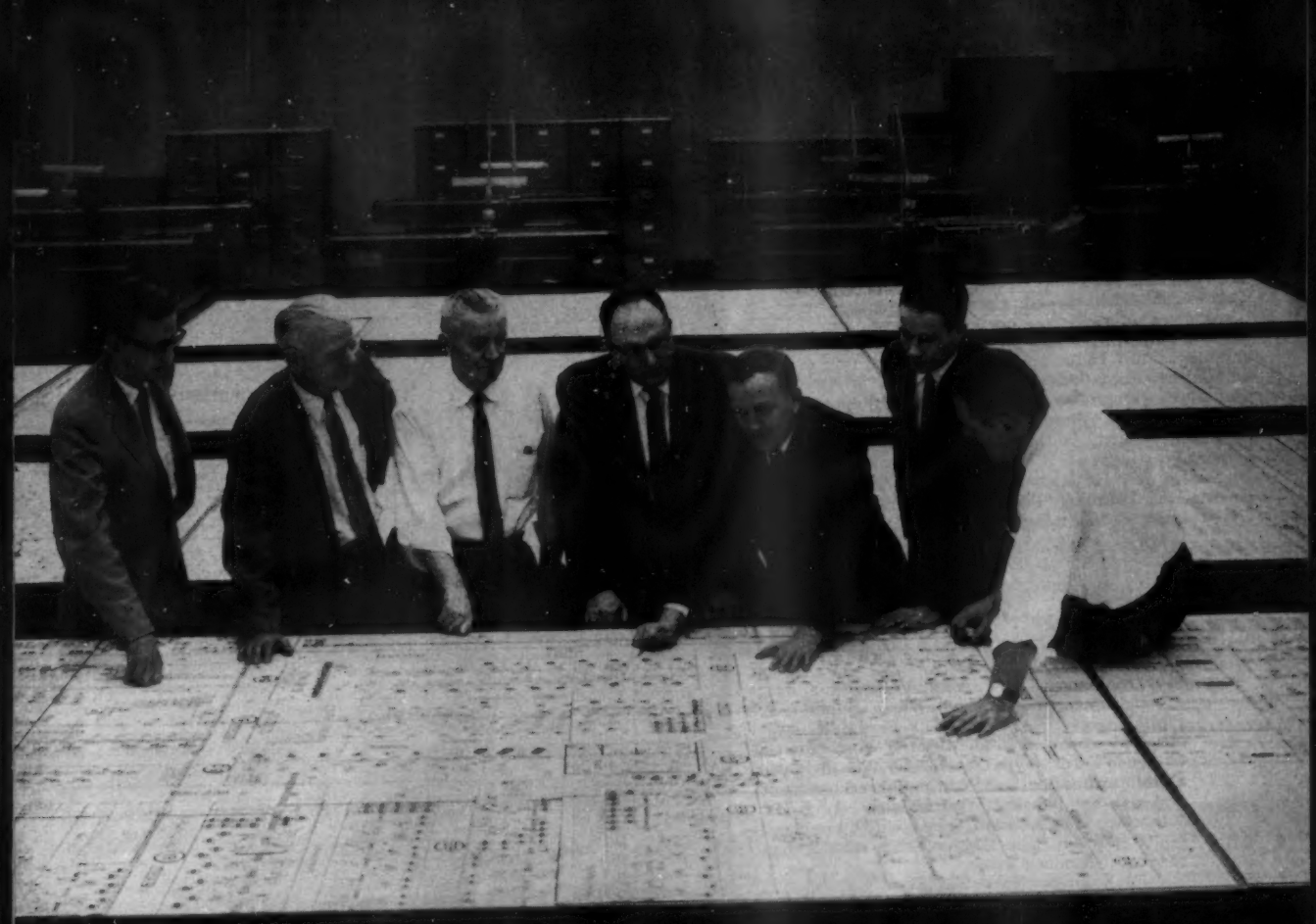


Westinghouse electrical system specified to Power-Up Ford products plant

YOU CAN BE SURE...IF IT'S Westinghouse

COVER PHOTO: Assembled in the plant layout room of the Ford Motor Co., General Products Division Plant, Indianapolis, Ind., are: Melvin Wetterlin, Westinghouse Sales Engineer, J. Vance Garinger, Project Engineer, Hatfield Electric Co., Inc., Electrical Contractors; S. V. Cornforth, Maintenance Engineer, Plant Engineering Department, Ford, Indianapolis; D. A. Kerry, Supervisor, Ford General Products Division Staff, Dearborn, Michigan; H. P. Jones, Manager, Plant Engineering Department, Ford, Indianapolis; James Miller, Westinghouse Construction Sales Engineer; and R. Richards, Supervisor, Engineering Planning, Plant Engineering Department, Ford, Indianapolis.

Melvin Wetterlin, J. Vance Garinger, and J. Rodriquez, Power and Waste Supervisor, Plant Engineering Department, Ford, Indianapolis, look overhead to identify the Westinghouse 45-kva DT-3 dry-type transformer, Westinghouse aluminum bus duct and Westinghouse fluorescent and high-bay lighting. Westinghouse NLAB-LX column-type panelboard, shown with trough and pullbox, is fed from the secondary of the dry-type transformer above.

Main entrance to Steering Gear and Cold Heading Plant, General Products Division, Ford Motor Company, Indianapolis, Indiana. Westinghouse electrical distribution system is used to meet present electrical needs, provide the necessary flexibility to permit extensive rearrangement of production machinery whenever required and to assure maximum facility in expanding to satisfy all future demands.

J-94104-2

Ford plant planning anticipates future power needs

The Ford Motor Company plant in Indianapolis, Indiana, where these pictures were taken, occupies more than 1,400,000 square feet of floor area. It requires a constant power supply of 26,500-kva. The combination of great size, large capacity and exacting, but frequently varying, production schedules makes it imperative that plant engineering must go beyond careful control of everyday operation. Planning for future demands becomes equally important.

Westinghouse, working with architects, consulting engineers, general contractors, electrical contractors and Ford engineers, had an active part in equipping this plant with the electrical distribution system and with other electrical components required to assure uninterrupted operation and provide for anticipated expansion. For example, 144 Westinghouse dry-type transformers of various ratings are mounted at heights varying from 22 to 45 feet above floor level, above conveyor trusses. The light weight, ease of installation and minimum maintenance requirements of these dry-type transformers have made it possible to locate them so each provides the required voltage, with minimum loss, to the equipment it supplies.

Over 6000 Westinghouse high-bay mercury vapor fixtures give daylight-type lighting in production areas, and these are supplemented by Westinghouse fluorescent lighting for the general illumination required by nighttime clean-up workers.

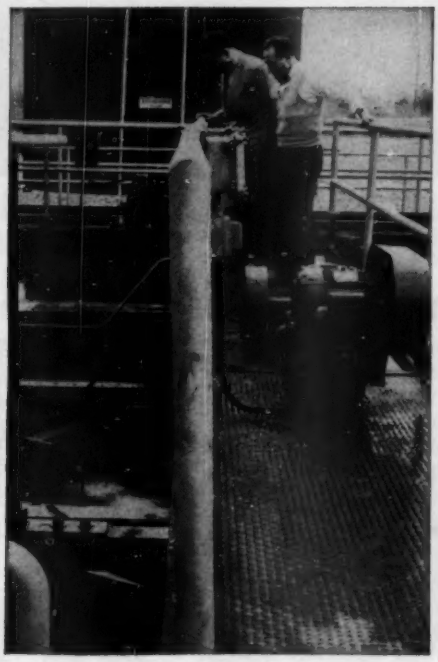
Approximately 2½ miles of Westinghouse 600-amp, 480-v, 3-pole, aluminum plug-in bus duct, mounted in 17 parallel straight runs (shown as

(continued)

J-94104-3

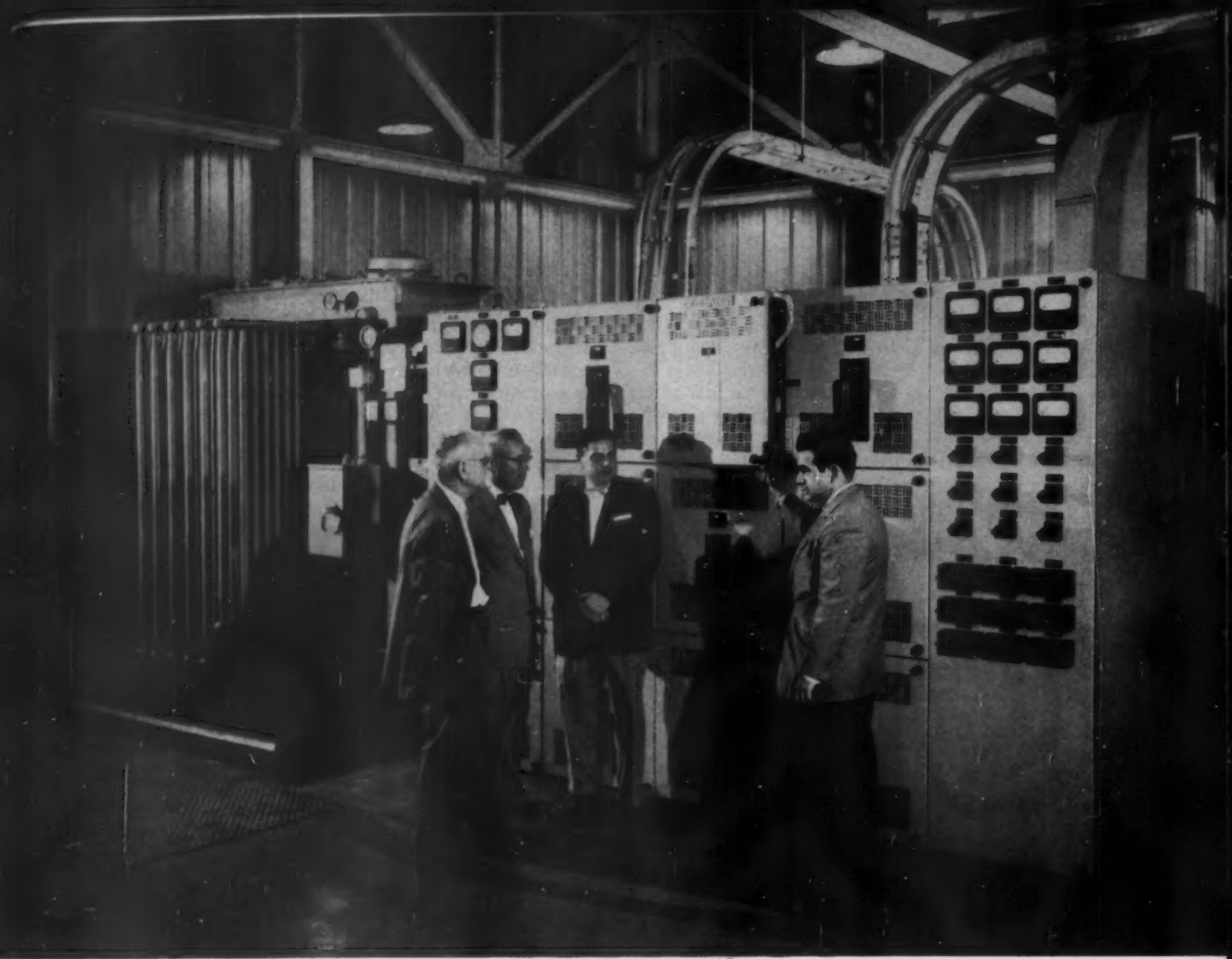
YOU CAN BE SURE...IF IT'S **Westinghouse**

J. Rodriquez checks substation meter to make certain power factor constant at 98% lag is being maintained throughout the plant. This extreme efficiency of the electrical system is made possible by the use of Westinghouse capacitors.



J. Rodriquez and W. D. Eason, Engineer, Waste Treatment Plant, Plant Engineering Department, stand beside Westinghouse 7.5-hp totally enclosed Life-Line® "A" motor which drives the waste oil recovery tank agitator.

Shown between Lloyd L. Williams, Branch Mgr., WESCO, Indianapolis, and Paul E. Butalla, Main. Supvr., Plant Engin. Dept., Ford, Indianapolis, is Westinghouse Slipsyn® synchronous motor starter providing automatic starting and field application control for Westinghouse 400-hp, 440-volt motor.



J. Vance Garinger, Lloyd Williams, C. E. Hamm, Sales Rep., WESCO, Indianapolis, and J. Rodriquez shown before one of the nine power centers which distribute the 26,500-kva load throughout the plant. Power centers have stand-by circuit breakers and blank cubicles equipped for future needs.

Ford plant planning anticipates future needs *(continued)*

heavy black lines in diagram), have been installed to provide maximum flexibility in locating production machinery.

Westinghouse can help you with any phase of your electrical planning and construction. See your Westinghouse distributor, or write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

Ford Motor Company
Steering Gear and Cold Heading Plant
General Products Division
Indianapolis, Indiana

Architect-Engineers: Smith, Hinchman and Grylls Associates, Inc.
Consulting Engineers: (Waste Treatment Plant) Hubbell, Roth & Clark, Inc.
General Contractors: Cunningham-Limp Co., Inc.
Electrical Contractors: Hatfield Electric Co., Inc.
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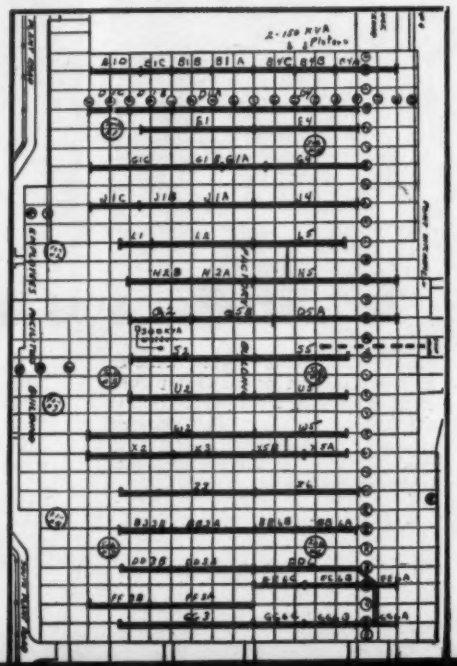

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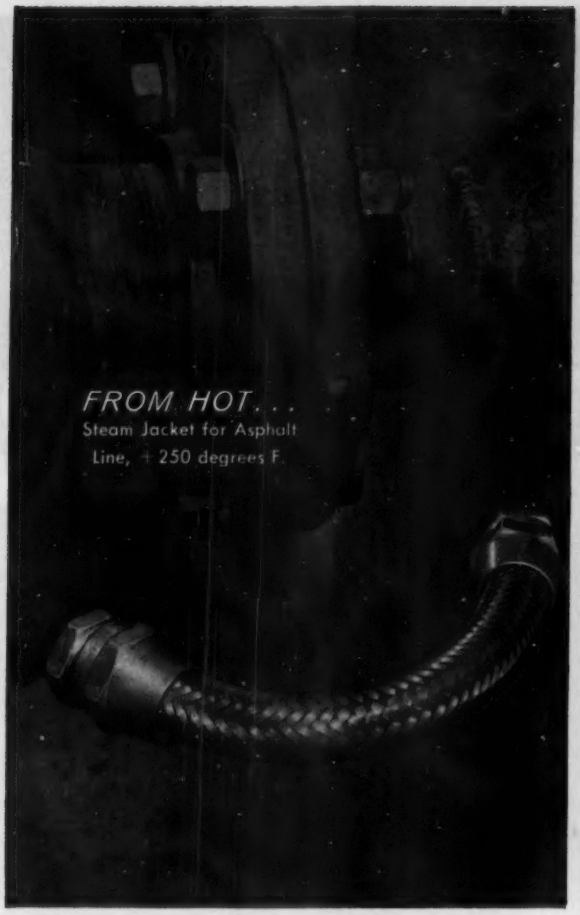

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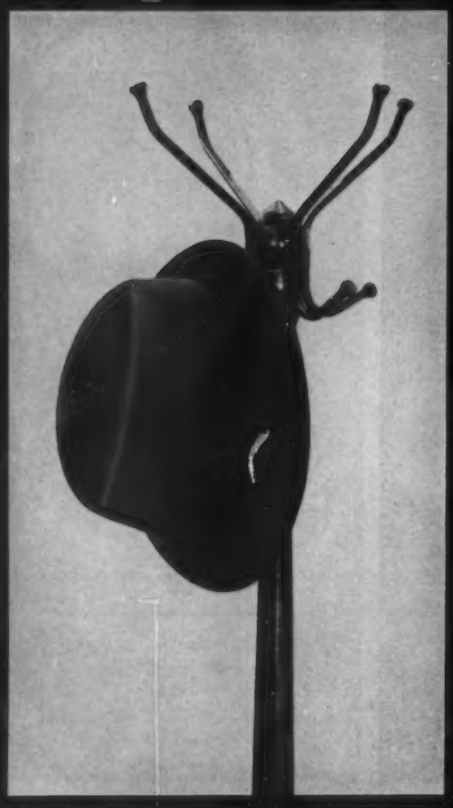

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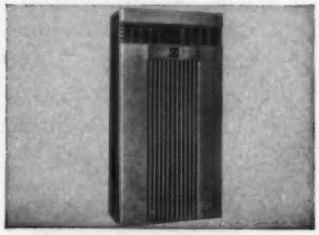

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SOURCE...

can give you answers to all your air-conditioning problems

Whether you're installing a large central or "zone" system, or a system for a smaller plant—for the facts, the experience and the products to help you reach the right solution to your air-conditioning problems, call in American-Standard* Industrial Division.

You see, American-Standard Industrial Division supplies the major components that go into air conditioning – heating, cooling, air moving, cleaning, and moisture control—to give you one-source responsibility for quality and performance in equipment that is designed, engineered, and manufactured to work together.

There are offices in all principal cities, staffed by product specialists to assist with equipment selection and on-the-job problems. Call today. AMERICAN-STANDARD INDUSTRIAL DIVISION, DETROIT 32, MICHIGAN. IN CANADA: AMERICAN-STANDARD PRODUCTS (CANADA) LIMITED, TORONTO, ONTARIO.

* American-Standard and Standard® are trademarks of American Radiator & Standard Sanitary Corporation.

AMERICAN-Standard
INDUSTRIAL DIVISION

AMERICAN BLOWER PRODUCTS • ROSS PRODUCTS • KEWANEE PRODUCTS

For more facts circle 509 on Reply Card

General Electric announces . . .

NEW DRAW-OUT DESIGN

From General Electric comes the all-new draw-out Limitamp control—today's most advanced medium-voltage motor starter. Designed for the control of a-c motors rated 2300 through 4600 volts and up to 3000 hp, this new air-break starter has broad application throughout industry.

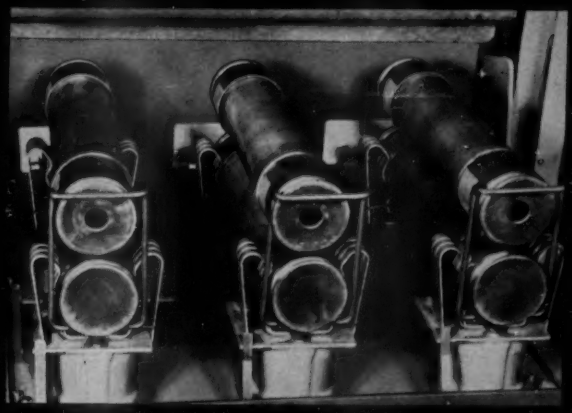
Since its introduction in 1941, Limitamp control has established a reputation for being first with the design features that add up to major user benefits. And, today's all-new Limitamp control follows this pattern with a host of design innovations that make for:

Faster installation: When you're ready to roll in the contactor—it can be done easily by one man. And, there are no connections to make—they are made automatically as the contactor rolls into place. There's plenty of space inside the panel for pulling the motor and power cables . . . and making the connections. And, with the new design, floor sills have been eliminated. This means no more grouting, no expensive cement work, simplified lineup with other panels.

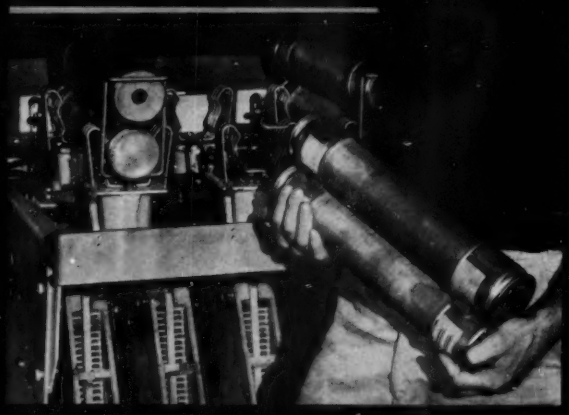
Simpler, safer operation: One handle now controls the complete operation of connecting and disconnecting the starter from the bus and mechanically locking the high-voltage compartment door. A unique interlocking system protects the unit from misuse.

Superior protection: General Electric's new Limitamp

INSTALLS IN HALF THE TIME—Draw-out air break contactor, roomy isolated cable compartments, and increased working space help simplify installation.



LIMITAMP CONTROL IS ISOLATED AUTOMATICALLY—A unique shutter box isolates the starter from high-voltage power when the operating handle is turned to the off position.



INTERRUPTS FAULT IN FIRST ½ CYCLE—Fast-acting, current-limiting fuses interrupt circuit before short circuits cause damage to valuable motors.

NORMAL MAINTENANCE WITH CONTACTOR IN PLACE—All components, including the high-voltage contactor, can be maintained right in the control unit, with complete safety.

LIMITAMP* CONTROL

control utilizes fast-acting current-limiting fuses, ambient-compensated overload relays, and a high-voltage contactor to provide the most "positive" protection for your motors. Proved EJ-2 fuses interrupt a fault in the first ½ cycle, thus reducing damage to valuable motors. The performance of the completely coordinated design has been exhaustively tested in General Electric's high-voltage laboratory to provide the most reliable equipment for your application.

Easier maintenance: Even with these advanced design features, new Limitamp controls are simpler than ever to maintain. All components are accessible from the front for inspection and maintenance—without removing them from the enclosure. A special test circuit is built into each unit—permitting check-out operation before the unit is put into service.

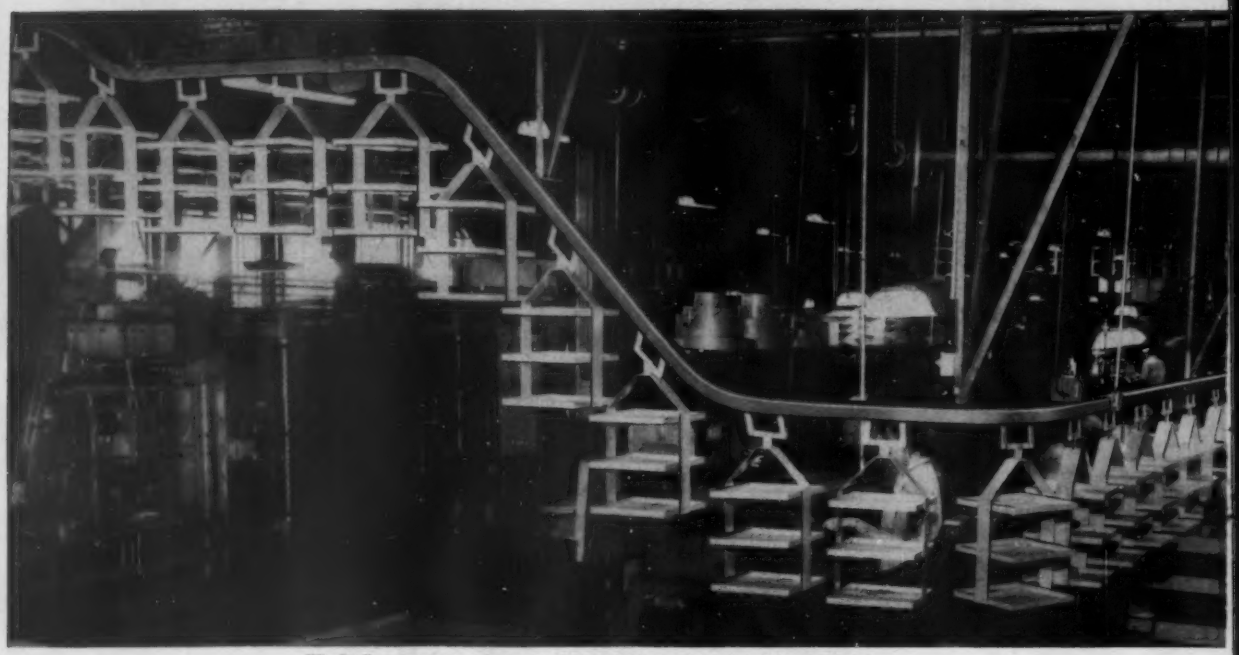
For full information on all-new Limitamp motor control, contact your G-E Apparatus Sales Engineer or Agent today. Or write Sect. 783-10, General Electric Co., Schenectady, N. Y., for Bulletin GEA-6893. Industry Control Dept., Roanoke, Virginia.

*Reg. trade-mark of General Electric Company.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 510 on Reply Card



"Zig-Zag" conveys parts and components where they're needed—when they're needed!

R-W "Zig-Zag"® CONVEYORS

"Zig-Zag"® FEATURES...

- **FLEXIBLE**... may be installed to go *up* to storage areas—*down* to production stations—*in, out* and *around* pillars, doors, machinery, etc. R-W "Zig-Zag" Conveyors carry unit loads up to 125 lbs. at speeds ranging from one inch to, if required, 100 feet per minute.

  The only conveyor of its type with a *proven multi-speed drive*... permits expansion at any later date. "Zig-Zag" is equally adaptable for installations of all sizes—no matter how large or how small.

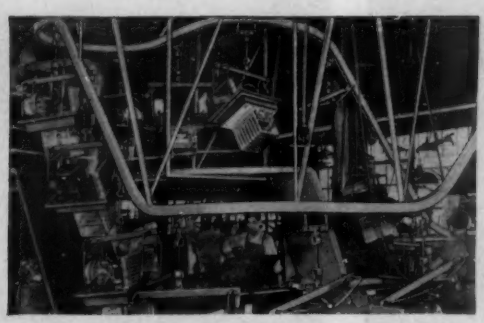
- **STRONG**... a continuous chain of alternate horizontal and vertical wheels travels through a rugged steel track much like water flows through a pipe. All moving parts of the chain are fully enclosed and protected from dust, dirt, etc. Chain, track, power units and accessory equipment are all designed to provide years of dependable, trouble-free service.

- **ECONOMICAL** to purchase, install and operate. Completely re-usable in case of plant changes... may be relocated, changed or expanded to meet plant alterations or expansion. One large system can be later changed to make two smaller ones or vice-versa.

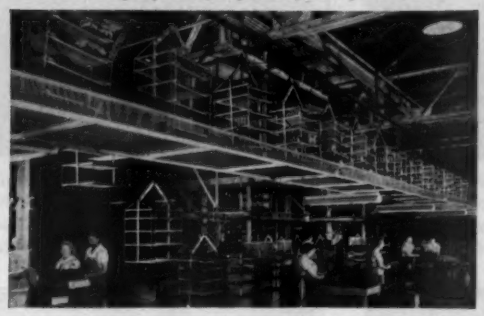
- **EFFICIENT**... R-W "Zig-Zag" is the *original* conveyor of its capacity in this field—available in one, top-quality grade—inferior components are never offered as a substitution. Designed, manufactured and backed by Richards-Wilcox, a leading firm in the overhead materials handling field for over 75 years.

REDUCE COSTS IN EVERY MANUFACTURING AND WAREHOUSE OPERATION

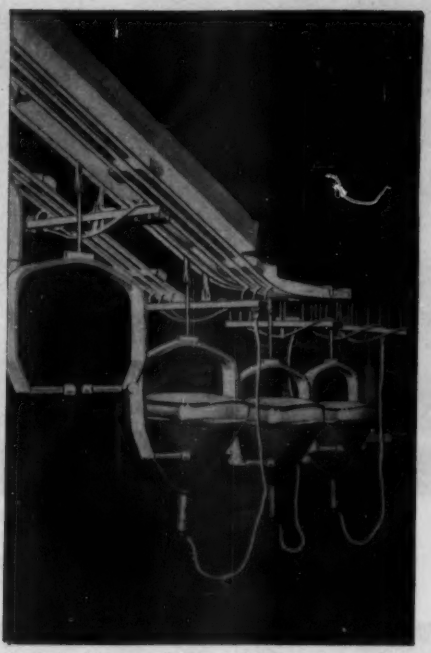
R-W "Zig-Zag" Conveyors will help you cut costs throughout the entire plant... providing a cost-reduction that could increase your annual profit as much as would a hard to achieve 50% increase in sales. "Zig-Zag" conveyors will reduce costs on an over-all basis by efficiently utilizing overhead space to provide a steady flow of parts and components... they help to make individual work stations more efficient and provide a visually apparent inventory storage in the "free" area under the building trusses. "Zig-Zag" Conveyors safely carry products through all production processes with increased speed and lower operating costs. Automatic devices of all types can be included in a "Zig-Zag" System to provide "machine-muscle" for the raising, lowering, moving and transferring of materials, components and products.



Flexible..."Zig-Zag" conveyors go exactly where you want them!



Provides part and component inventory in "free" overhead area!



"Zig-Zag" safely conveys TV tubes and similar products—reduces product breakage loss!

...PROFITABLY AND EFFICIENTLY CONVEY PRODUCTS UP-DOWN-IN-OUT and AROUND!

"ZIG-ZAG" to "TWIN-TRAK"... from automatic conveying to complete automation in the handling of materials

"Zig-Zag" components provide the backbone of R-W "TWIN-TRAK" Overhead Automatic Dispatch Systems... the ultimate in automated conveying of materials, components and products. R-W "TWIN-TRAK" Systems consist of one or more power tracks and as many storage or free tracks as desired, plus the necessary switches, carriers, automatic controls and power equipment. They not only move products from one point to another, but automatically and economically convey components to predetermined work stations from overhead storage or inventory banks. This unique system not only improves materials handling, but, because of its great versatility, permits the coordinated use of special new production techniques and machinery to produce products faster and more economically.

ON-THE-SPOT ENGINEERING SERVICE

Your local R-W Sales-Engineer is a factory trained materials handling specialist. He stands ready and willing to illustrate how an efficient R-W Overhead Conveying system will help you realize maximum production efficiency and economy. Whether you are planning a new plant or expanding present facilities, it will be to your advantage to let an R-W Sales-Engineer survey your problem and submit a recommended solution.

WRITE FOR ANY OF THE FOLLOWING CATALOGS

- R-W "Zig-Zag" Continuous Powered Conveyor, Catalog No. A-93R
- R-W "TWIN-TRAK" Overhead Automatic Dispatch Systems, Catalog No. F-192
- R-W "TRU-TRED" Monorail Systems, Catalog No. A-64
- R-W "SAFE-RAIL" Conveyor Equipment, Catalog No. A-94R
- R-W "458" Chain Conveyor Systems, Catalog No. A-570

Richards-Wilcox

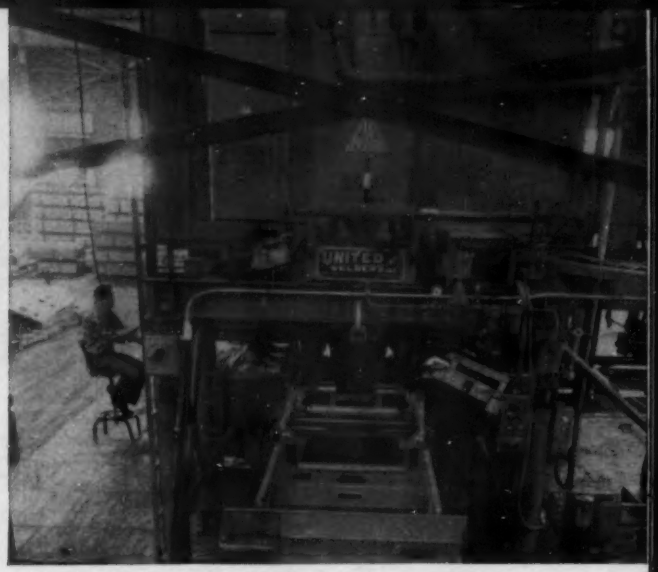
MANUFACTURING COMPANY

"MATERIAL HANDLING DIVISION"

460 W. THIRD STREET • AURORA, ILLINOIS

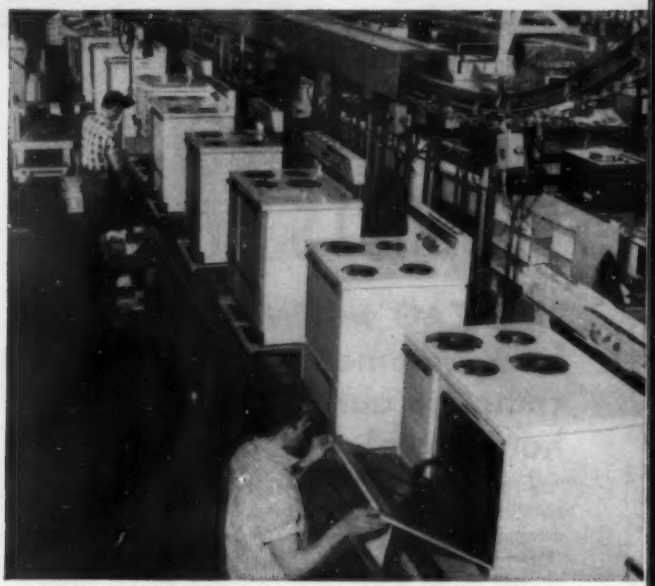
For more facts circle 511 on Reply Card

1. Initial stamping. This 850-ton press in the range plant at GE's Appliance Park, turns out range bodies (flat) at the rate of 300 an hour. Used in the press are Gulfcrown® Grease, a Gulf E.P. Lubricant and Gulf Harmony® oil.



2. Welding and forming. After leaving the press, the flats are assembled in an automatic welder-former (background) and proceed on a fully automated line that has over 400 lubrication points, all serviced with six Gulf lubricants.

5. High speed plating. Hydraulic system in foreground provides power to move plated components (such as broiler trays) through plating tanks. Gulf Harmony is the power medium in this and other such plant systems.



6. Completed ranges. Operator tests a removable oven door on a GE range moving along the free standing assembly line. More than 1,600 of these units are turned out daily at GE's Appliance Park.

Large electric range plant meets complex lubrication

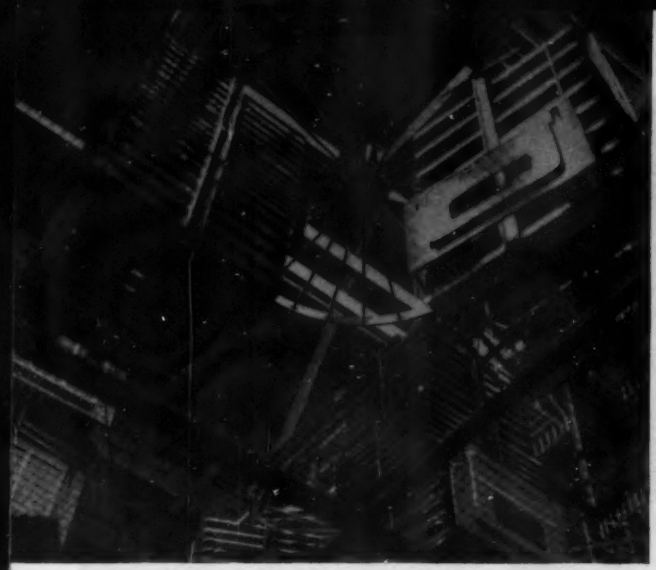
GULF MAKES THINGS

"We turn out more than 1,600 ranges a day in a highly mechanical plant that has thousands of lubrication points. Up until 4 years ago we had the problem of too many lubricants—dozens of them—that had been purchased for specific machines and applications. Each served its purpose well, but handling was complicated.

"A Gulf Engineer—after a comprehensive survey of our lubrication problems—helped us reduce our plant lubricants from dozens down to a total of only six Gulf oils and greases—and helped us set up lubrication schedules that pay off in greater efficiency."

That's the word from W. G. Montgomery, Superintendent of Building, Tools and Equipment in the Range Department of General Electric's huge Appliance Park near Louisville, Kentucky.

Shown above are a few of the highlights in the automated forming and assembly line at the General Electric range plant—where all lubrication needs are met by



3. Automated conveying. 12 miles of conveyors move range bodies automatically. Gulfcrown Grease lubricates conveyor bearings. Gulf Harmony oils are used on chains and sprockets. Gulf E.P. Lubricants on speed reducers.

4. Heat processing. Conveyors take range components past batteries of heat lamps. A special heat-resistant Gulf grease lubricates and protects the free roll bearings. Gulf makes things run better—even when the "heat's on."

7. Scientific lubrication. Three oilers, using the same six Gulf lubricants, service entire automated production line. Daily lubrication is done on second shift. Hydraulic systems are changed yearly during summer shutdown.

8. Gulf man on the job checks with GE man on advantages of simplified lubrication plan. Left, W. G. Montgomery, Superintendent of Building, Tools and Equipment, Range Department. Right, Earl Straub, Gulf Sales Engineer.

demands with six Gulf lubricants . . .

RUN BETTER!

only six basic lubricants recommended by Gulf. With this simplified lubrication plan, this plant not only frees personnel for other work, but reduces both lubricant inventory and purchase costs.

Simplify your plant lubrication with the built-in versatility of Gulf quality lubricants. See how Gulf makes things run better. Just call a Gulf Sales Engineer at your Gulf office. Or, write for bulletins on Gulf Harmony oils, Gulf E.P. Lubricants and Gulfcrown Grease.

GULF OIL CORPORATION
Dept. DM, Gulf Building
Pittsburgh 30, Pa.

GULF

For more facts circle 512 on Reply Card

Modernize your motors with new Super Coilife or Thermalastic

Moisture, acids, alkalis and other contaminants are locked out permanently by exclusive Westinghouse insulations . . . new Super Coilife* and Thermalastic®. These insulations are thermally stable, chemically inert. They stay elastic, hug the copper to which they are applied and increase motor operating life.

For random wound motors, new Super Coilife is a special application process using solventless epoxy encapsulation. This exclusive process controls the predetermined "thin wall" of the encapsulation for total protection and maximum thermal transfer of heat from the windings. The mirror-like orange finish will not crack or craze even under severe operating conditions.

For large motors and generators, another exclusive insulation is Thermalastic. Voltage tests prove that Thermalastic insulation has a 1000 to 1 advantage. Operating voltages can't get through the fish-scale-type barrier of large mica splittings which are locked in a memory-type elastic resin bond.

Only Westinghouse can supply these new insulation developments that will modernize your equipment and extend its life. Call your Westinghouse representative for the complete story of Westinghouse Modern Maintenance service. Special booklets on Super Coilife, B-7622, and on Thermalastic, B-7249, are available on request. Write Westinghouse Electric Corporation, P.O. Box 868, 3 Gateway Center, Pittsburgh 30, Pa.

*Trade-Mark J-95179

YOU CAN BE SURE...IF IT'S

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS

USE WESTINGHOUSE MODERN MAINTENANCE SERVICE... SHOP REPAIR... RENEWAL PARTS... FIELD SERVICE

For more facts circle 513 on Reply Card

BULLETINS just released and of immediate plant interest

Reader Service Cards for ordering bulletins are on pages 251-252. Be sure to include your name, job title, and company, even if you want bulletins mailed to your home address.

AIR HANDLING

101 Industrial Fans—Fundamental data relating to capacities and construction of company's line of industrial fans incorporating a universal discharge are presented in 28-pp Bulletin L-5. Includes rating tables giving volumes of air delivered, rpm, horsepower at various static pressures, and outlet velocity and velocity pressures, as well as tables of correction ratios for deviations from standard atmospheric conditions. Lehigh Fan & Blower Div., Fuller Co.

102 Elbow Fans—Bulletin VEF-59 describes elbow fans for handling clean, contaminated, hot or explosive air or fumes at normal or elevated temperatures. Contains tables of sizes and dimensions, selection data and capacity tables. L. J. Wing Mfg. Co.

103 Air Handling Equipment—Bulletin CL-551 illustrates and describes a line of air handling equipment, including centrifugal fans, blast coils and air washers. Applications are described and condensed selection tables given. Bayley Blower Co.

MECHANICAL POWER TRANSMISSION

104 Adjustable-Speed Drives—Twelve-pp Bulletin D-2507 gives detailed performance and application data on the all-electric, adjustable-speed V*S Jr. drives. Typical applications employing drives from ⅛ to 4 hp, specifications, dimensions, and gearmotor selection table are given. Bulletin is illustrated with photos and cartoon drawings. Reliance Electric & Engineering Co.

105 Worm Gear Reducers—Single-reduction worm gear speed reducers with a new high-load-capacity thread form are described in 32-pp illustrated Catalog 3805. It covers Delroyd reducers utilizing worm and gear materials permitting maximum ratings allowed by AGMA rating standard. Four types are presented: one for 2½- to 4-in. centers, adaptable to any mounting position; and types for bottom drive, top drive and vertical mounting, all for 5- through 12-in. centers. Catalog gives information on advantages of worm gears and how to select them; includes specifications, ratings. DeLaval Steam Turbine Co.

106 Variable Speed Drives—Designated M-592, this 96-pp catalog explains through copy, photos and drawings the wide assortment of styles, modifications and accessories available in company's complete line of mechanical variable-speed Motodrives. It includes construction features, specifications, speed and rating tables, and pricing information. Reeves Pulley Div., Reliance Electric and Engineering Co.

107 Helical Gear Reducers—Information on a complete line of helical gear speed reducers is contained in 20-pp Book 2751. Provides selection data on 20 reducer sizes in double, triple and quadruple reductions, and contains tables of load classes and service factors, horsepower and torque ratings, dimensions, overhung load for high and low speed shafts, and mounting arrangements. Link-Belt Co.

VALVES, PIPING, FITTINGS

108 Bronze Gate Valves—Bronze gate valves designed for tough service and easy maintenance are described in Bulletin AD-2340. Two lines are outlined, rising stem and non-rising stem, in sizes ¼ through 3 in. with screwed ends. Sizes and dimensions are included. Crane Co.

109 For High Pressures—Dimensional data and type drawings for stainless steel taper seal valves and fittings are included in 12-pp Catalog 759. Describes specific applications for pressures of 15,000 psi, and gives envelope dimensions, applicable tubing sizes, standard connections data. High Pressure Equipment Co., Inc.

110 Control Valve—Catalog Sheet Section IV describes an adjustable cam, lever-operated control valve designed to maintain accurate flow-pressure drop ratios for oil, steam, water, air and gas pressures to 300 psi. It is used chiefly to control flow of fuel to a burner in response to instrument control. Bulletin presents features, operation and installation information, illustrations and performance curves. Atlas Valve Co.

111 On Solenoid Valves—Included in this 8-pp booklet on specifying solenoid valves are sections on nomenclature and a description of various types of valve sealing; a discussion of mechanical specification criteria including application description, fluid characteristics, pressure, capacity, leakage, valve life, speed of operation, and envelopes; electrical specification criteria including explanation of solenoid, duty, electrical connections and coil construction; environmental specification criteria. Valcor Engineering Corp.

112 Surge Relief Valve—Bulletin SEW-1 describes a sewage surge relief valve designed to prevent damage from overpressure in sewage lines. Drawings illustrate important features and tables list data on materials, dimensions, and specifications. Golden Anderson Valve Specialty Co.

113 Pipeline Strainers—Bulletin 1210-1 describes a line of self-cleaning pipeline strainers in sizes from ¼ through 3 in. Construction features, ratings, dimensions and weights are supplied. Sarco Co., Inc.

114 Recommended Piping Practice—Suitable for posting on bulletin board, this wall chart is divided into five sections covering basic valve types, connections normally used, installation and maintenance tools, installation, operation and maintenance. Illustrations of valves, engineering specialties and lubricating devices appear on back. Lunkenheimer Co.

115 Branch Connection Fitting—Six-pp Bulletin TF-1-59 contains data on branch connection fittings designed for fast, durable and economical pipe branchings. Design data is given in tabular form. Forge and Fittings Div., H. K. Porter Co., Inc.

116 Corrosion Calculator—This detailed calculator, showing preferred materials for different types of corrosives, is designed as a guide to the selection of materials of valve construction, based on "substantial", "moderate", "questionable" or "inadequate" resistance to the chemical in question at atmospheric pressure and temperature. Hoke Inc.

117 Connection Fitting—Advantages of the W-S Fishmouth for making branch connections are illustrated and described in this 16-pp booklet. Covers cost comparisons, engineering design data, and illustrates typical installations. Forge and Fittings Div., H. K. Porter Co., Inc.

DUST, FUME CONTROL

118 Exhaust Purifiers—How this company's exhaust purifiers serve to kill carbon monoxide, fumes and odors from gasoline, LP-gas and diesel-powered equipment is discussed in this bulletin. Gives technical characteristics of a catalytic exhaust purifier, dieseler, and muffling device, and includes performance data. Oxy-Catalyst, Inc.

119 Mechanical Dust Collectors—Recent improvements in mechanical dust collectors including a new involute design are described in 8-pp Bulletin 300. Contains detailed drawings and application diagrams about the involute design and other features. Research-Cottrell, Inc.

PUMPS, COMPRESSORS

120 Turbine-Type Pumps—Eight-pp Bulletin S-111 illustrates and describes features and applications of company's turbine-type pumps in capacities to 150 gpm. Exploded views, selection tables, limitation charts, dimensions, construction specifications, and detailed engineering specifications are included. Aurora Pump Div., The New York Air Brake Co.

BULLETINS

(Begins on page 21)

121 **Centrifugal Pumps**—Bronze and iron centrifugal pumps with capacities to 320 gpm and pressures to 40 psi are described in 6-pp Bulletin 1004. Performance data on clockwise, counter clockwise, and reversible pumps are included along with specifications, prices. Marine Products Co.

122 **Air Compressors**—Described in 28-pp Catalog 36A is a line of air compressors designed to meet a wide range of requirements in the ¼ through 20 hp range. A question and answer engineering section answers some of the more common questions on theory and application, and charts give necessary selection data. Brunner Div., Dunham-Bush, Inc.

123 **Process Compressors**—Heavy duty balanced/opposed compressors for the refining, chemical and petrochemical industries are featured in 46-pp Bulletin 160. Advantages of design and construction are illustrated and described, cross-sections of cylinders and detailed specifications are included. Clark Bros. Co.

124 **Eliminating Explosions**—Bulletin 173, 12-pp, presents recent findings on mechanism of explosions in pipelines and compressor starting air lines. Discusses research on nature of explosions and shock waves in piping, and these observations are applied to compressor air starting systems. Concludes with discussion of preventive measures for eliminating such explosions. Clark Bros. Co.

PACKINGS

126 **Molded Packings**—This 8-pp engineering bulletin presents technical information on the T-shaped form of Palmetto molded packings, the G-T ring. Includes service recommendations, specifications and application data. Lists 88 packing sizes for use as piston seals, 68 sizes for rod seals. Typical applications are shown in schematic diagrams and cutaway drawings. A reference chart covers compatible fluid services, temperature ranges, specific packing compounds, selection of component back-up rings. Greene, Tweed & Co.

127 **Mechanical Packing Guide**—This 64-pp catalog, Form PK-131A, contains comprehensive information on mechanical packings and is generously illustrated with photos, specification charts, tables. Each packing style carries a symbol to aid in quick identification of media the particular packing will best serve against. Includes chemical selection chart which lists more than 700 liquids common to process industries. Also featured is a simplified packing selection chart to help relate particular operating conditions to the most suitable packing construction style. A section of book is devoted to determining causes of trouble. Johns-Manville.

BOILERS, GENERATORS

128 **Packaged Steam Generator**—The performance story of a prototype stoker-fired packaged steam generator in a typical installation is told in 8-pp Bulletin PG-59-4. A complete evaluation of performance is given. Foster Wheeler Corp.

129 **Automatic Boilers**—Powermaster Model 3 packaged automatic boilers are described and illustrated in 12-pp Bulletin 1260. Boiler types, including gas, oil and combination gas-oil models, a specially-designed hot water boiler, and steam atomizing principle for use with No. 6 oil are included. Ratings and dimensions of all sizes given, as well as details of burners. Orr & Sembower, Inc.

130 **Smaller Packaged Boilers**—Bulletin 1243 describes Power-Pak packaged automatic boilers in the 15- to 25-hp range for low pressure steam or hot water heating. These units include integral oil, gas or combination firing equipment control and safety features. Tells features contributing to boiler room economy. Includes dimensions, weights, ratings. Orr & Sembower, Inc.

131 **Wet Back Boiler**—Featured in Bulletin B-3240 is a three-pass power and heating unit with all wet back construction. In addition to mechanical and thermal features, results of operational tests are given. The Titusville Iron Works Co.

132 **Rolled Recirculated Gas**—Bulletin G-96, 16-pp, contains detailed information on recirculated gas and its relation to boiler design and operation. Discusses thermodynamic effect of recirculated gas, mixing of recirculated with combustion gas and its application to boiler design and operation. Line and bar graphs and boiler drawings supplement text. The Babcock & Wilcox Co.

TUBING

133 **Heat Exchanger Tubes**—Eight-pp Bulletin TB-431 describes attributes of company's Lectrosonic heat exchanger tubes, demonstrating how quality controlled manufacturing procedures provide for good fit in tube sheets, ease of fabrication and optimum fluid flow. Specifications and data included. Tubular Products Div., The Babcock & Wilcox Co.

134 **To Trim Tubing Costs**—To point up advantage of tubing vs. bar stock, particularly if an alloy steel is involved, Bulletin TB-430 serves as a primer on how to cut cost by using mechanical tubing. Discusses initial cost, structural advantages of tubing, fabrication by machining, types of steel, types of tubes, procurement. Tubular Products Div., The Babcock & Wilcox Co.

MATERIALS HANDLING

135 **Monorail Systems**—This 8-pp bulletin lists standard details for making up single monorail systems, and covers curves, tongue switches, slide switches, clamps, brackets, angles and various other fastenings which can be combined in a variety of ways to form the track suspension. Dimensional diagrams are included. Philadelphia Tramrail Co.

136 **Custom Cranes**—Twelve-pp Bulletin 5000-B describes and illustrates electric and hand operated overhead traveling cranes, jib cranes, hand hoists, I-beam trolleys, and special crane-type equipment. Covers in particular detail custom-engineered overhead electric traveling crane bridges and electric trolley hoists, available in a wide range of capacities, speeds and spans. Conco Engineering Works.

137 **Do-It-Yourself Cranes**—This illustrated bulletin introduces "Build Your Own" cranes in which the user need only supply bridge and runway beams—everything else being furnished in cartons complete with instructions. Shows assembled unit, collector and track mounting brackets, end trucks and tractor. Includes table of bridge beam sizes for use in figuring cost. Philadelphia Tramrail Co.

138 **On Spiral Conveyors**—Described in 60-pp Catalog 951 are spiral conveyors and fittings for meeting practically any requirement and operating condition. Four principal types—helicoid, sectional flight, ribbon flight, and cast iron—are listed along with special types. Selection tables list materials which can be effectively handled in a spiral conveyor, giving weights, loading classifications, characteristics and horsepower factors. Data on spiral feeders is provided. Also listed are unit drives, along with tables for drive selection. The Jeffrey Mfg. Co.

On pages 251-252 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

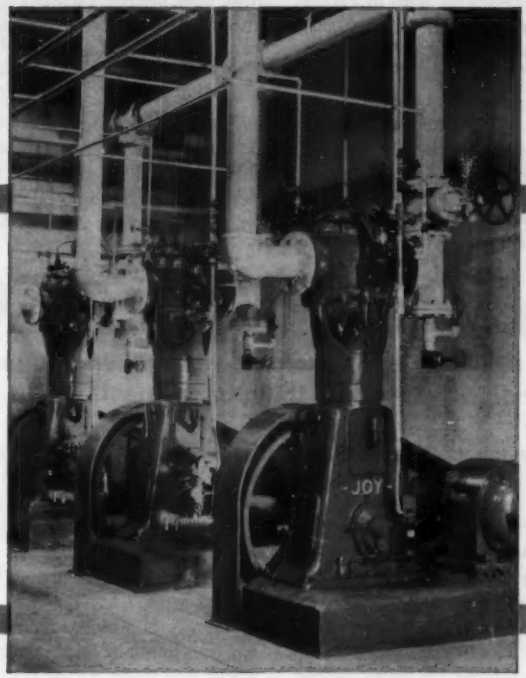
139 **Casters and Wheels**—Featured in 40-pp Catalog DP-104 is company's complete line of casters and wheels, including a heavy duty and a pneumatic series. Included is an index designed to simplify the checking of caster and wheel specifications for any particular application, covering duty classifications, product series, load capacities, product illustrations, etc. Rapids-Standard Co., Inc.

140 **Lease or Buy?**—This question which confronts prospective users of industrial trucks is discussed in detail in a 24-pp pocket-size booklet. Covers various lease plans offered by the company, and contains a series of tables for calculating cost of leasing. The Elwell-Parker Electric Co.

(More Bulletins on page 253)

FOR OIL-FREE AIR WITHOUT EXCESSIVE MAINTENANCE

JOY WGO-9 COMPRESSORS



A continuous supply of oil-free air is guaranteed by this multiple installation at a midwestern container factory. Vertical design means reduced maintenance . . . the piston ring need never be rotated.

This Joy WGO-9 supplies air free of contamination because it uses no lubrication in the cylinder. Lubrication is eliminated by the use of carbon-graphite or teflon piston rings. Exclusive piston ring design (patents pending) gives ring life of 8000 operating hours, and more. Joy has more than 20 years of experience with these special compressors, and as a result, has developed 14 sizes of the WGO-9 to meet your every requirement. Capacities run from 95 cfm—15 hp, to 939 cfm—75 hp. For larger volumes of oil-free air you can specify the WN series, up to 600 hp, 3696 cfm.

Get complete details on the Joy WGO-9, one of a complete line of compressors for industry. Write for free bulletin 337-15.

AIR MOVING EQUIPMENT FOR ALL INDUSTRY

JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

For more facts circle 514 on Reply Card

HELPFUL WATER CONDITIONING DATA FROM BETZ

WATER TREATMENT FOR

The newer developments of treatment for compressor and engine jacket systems have made water-side problems a thing of the past

THROUGHOUT THE YEARS the problems connected with the removal of heat from engines and compressors have received considerable attention from engine manufacturers, plant operating personnel, and water treatment consultants.

Engines and compressors first were designed for use with low temperature water at low velocity. These designs resulted in a large temperature rise through the system which set up unequal stresses in the metal, causing serious failures. To overcome this problem and to increase the efficiency of the equipment, manufacturers' designs have been changed so that the modern engines now operate with a rapid flow of water at a relatively high temperature, and with a temperature rise of only 10 to 15 F throughout the system.

At one time, little if any attention was given to the cooling water. It was not uncommon to use water on a *once-through* basis, taken from a stream that was subject to marked variations in dissolved solids and more particularly in suspended solids. Well waters high in hardness often were used so that heavy scale formation was common. Soon it was learned that scale formation and deposit accumulation from suspended solids could not be tolerated.

In other cases, cooling of the engines was accomplished with an *open recirculating system* using a cooling tower or a spray pond for dissipation of the heat. This method of cooling was a step in the right direction and permitted better control of the problems of scale formation, corrosion and slime. However, water-side problems could not always be solved economically, even with this type system.

The *closed recirculating system*, as illustrated by the dotted lines in Figure 1, then became popular and has been widely accepted as one of the most desirable ways of dissipating heat from the modern engine. This type of system is ideally suited to modern engine and compressor operation because a large quantity of water, at carefully controlled temperatures can be circulated through the equipment. From the standpoint of water caused problems, the small makeup water requirements of the closed recirculating system greatly simplify the situation. The only makeup required is to replace losses from leakage at the pump packing or from drainage of the system for repairs. Little, if any, evaporation loss takes place.

Because the closed recirculating system greatly simplified the water caused problems, it was frequently assumed that no water treatment was necessary. This assumption proved erroneous. Corrosion in closed cooling water systems serving the modern engine can lead to serious problems. As a result of metal loss, leaks often develop which cause loss of cooling water and seriously increase makeup requirements and once again intensify the water problem. The corrosion products that develop often cause plugging of the narrow cooling passages, restrict flow, decrease heat transfer and result in rapid deterioration of the engine.

The metals of construction in the modern engines, compressors, and cooling systems are many and include cast iron, steel, copper, various copper alloys and aluminum as well as solders. Nonmetallic components such as natural or synthetic rubber, asbestos and carbon also are involved. Wide temperature variations are encountered up to 180 F or higher and down to ambient (when the engine is off line) with a corresponding variation in oxygen content. The waters used in the cooling system vary in composition with geographical location. Because of these many variables, there is ample opportunity for oxygen pitting, galvanic action and crevice attack. Untreated systems will suffer serious deterioration from these forms of corrosion.

The use of a closed recirculating system does minimize makeup water requirements and therefore the use of softened water, condensate, or even demineralized makeup water becomes economically feasible thus eliminating the problem of scale formation. The low makeup requirements also make it possible to economically treat the system with adequate concentrations of effective corrosion inhibitors.

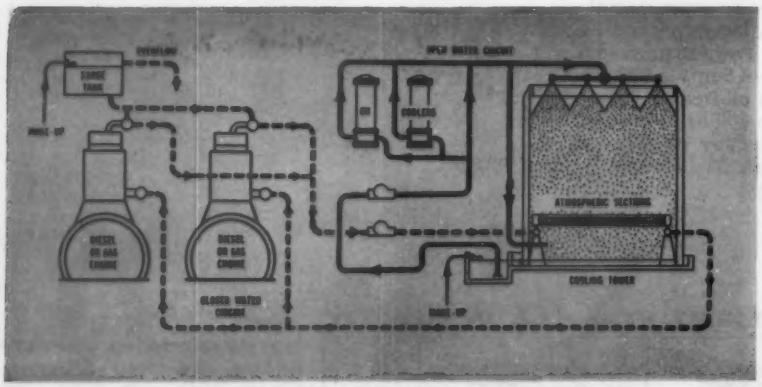


Figure 1—Typical flow diagram of cooling water systems in Diesel or gas engine service. Closed cooling system—dotted lines; Open cooling system—solid lines.

Corrosion Inhibitors for Closed Systems

The three most common types of corrosion inhibitors used for closed cooling water systems are the chromate base materials, the nitrite base materials and the soluble oil inhibitors. Of these three basic types, the chromate base materials are most commonly used. Buffered chromates in the range of 500-1000 ppm are satisfactory for waters low in chlorides and where bi-metallic influences are not encountered. Where chlorides of 100 ppm or more are present, increased con-

CLOSED COOLING SYSTEMS

centrations of buffered chromate types of treatment may be necessary. Where bi-metallic couples such as steel and copper are also present even greater treatment levels are required on the order of 2000 ppm or more. When aluminum or its alloys are also present the problem of preventing corrosion is even more difficult. The bi-metallic couple most difficult to cope with is that of copper and aluminum. Buffered chromate concentrations of 5000 ppm or more usually are not adequate. It becomes necessary to use other additives such as nitrates or silicates to supplement the chromate base materials.

In closed systems that must be protected against freezing during winter operation alcohols or glycols are often used. While buffered chromates may be used with methyl alcohol anti-freeze solutions, it is essential that the pH be maintained consistently at a high level otherwise reduction of the chromate will take place. Glycol anti-freezes and chromate base treatments are not compatible. The non-chromate type treatments are better suited for handling closed systems containing anti-freezes.

The problem of toxicity of high chromate concentrations on occasion may restrict the use of these materials, particularly when frequent draining of the system is necessary. However, usually provisions can be made to handle situations of this type.

Another problem sometimes is encountered where the use of chromate base materials may not be applicable. Compressor stations that handle gas high in hydrogen sulfide content sometimes are plagued with leakage of the gas from the power cylinder into the water circuit. In these cases reduction of chromate will take place leading to ineffective corrosion control and deposit formation.

The nitrite base materials find frequent use in the treatment of closed recirculating systems, particularly in those situations where the chromate base materials are not applicable. Nitrite is a suitable corrosion inhibitor for iron and steel when the pH value is maintained in the alkaline range. Nitrite is not an effective inhibitor for copper and its alloys and can not cope adequately with couples of these metals with steel. Accordingly, other inhibitors that are specific corrosion inhibitors for copper must be used with the nitrite. When aluminum is also present in the system, the corrosion problem is intensified and nitrates and silicates must be used to supplement the nitrite. The nitrite base treatments are poly-component, and are required usually at considerably higher treatment levels than the chromate base materials. These treatments have the advantage of being compatible with anti-freeze solutions and are less objectionable from the standpoint of toxicity. Their primary use is to handle these situations.

Soluble oils are good corrosion inhibitors and afford excellent protection to ferrous metals, copper and steel couples and are effective even when aluminum is present. Cavitation erosion attack also is controlled effectively by these inhibitors. For the most part soluble oils owe their effectiveness to their polar properties which permit adsorption of a film that acts as a barrier to corrosion. These agents must be used at relatively high treatment concentrations on the order of 1 to 2 percent or higher in some cases.

It is essential that these inhibitors be efficiently buffered and emulsified, otherwise heavy fouling of the cooling system can take place. Serious interference with heat transfer and overheating have resulted under these conditions. It is essential also that natural rubber hoses and gaskets be replaced with synthetic rubber to avoid difficulties with swelling and softening of these components.

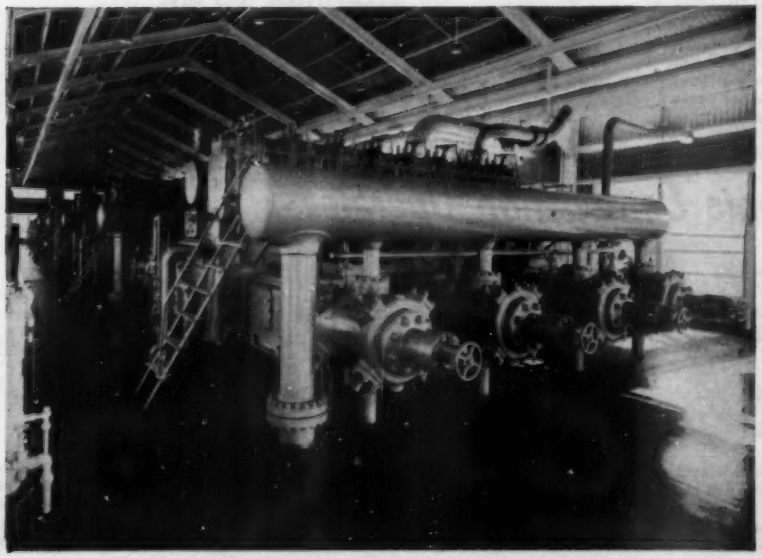


Figure 2—Operating floor of a modern compressor station.

Many new engineering advances have been made by Betz in the treatment of cooling water for compressor and engine jacket systems. The versatility of these methods makes them ideal for eliminating any water-side problem in closed cooling water systems . . . effectively and economically. A Betz Field Engineer will be pleased to discuss your cooling water problem and acquaint you with the savings that can be accomplished through the use of Betz service. A good time to call him in is *now!*

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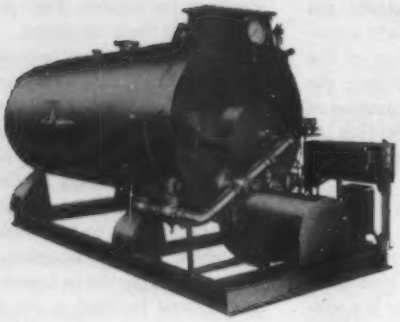

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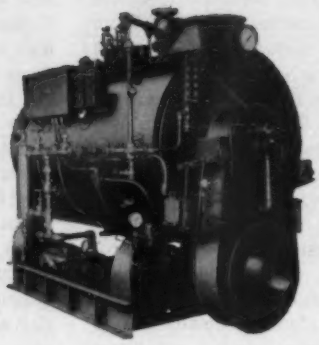
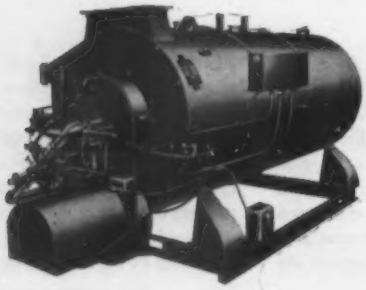
One Cyclotherm sells another! Repeat orders from satisfied users have put batteries of Cyclotherms in many of America's outstanding plants. We'd be happy to send you actual case histories. 18 models. 15 to 750 HP.



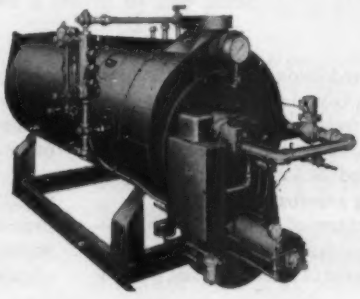
CYCLOTHERM MC (MARINE) LINE

A Cyclotherm Marine Boiler is installed on the nuclear ship Savannah. During and since World War II Cyclotherm Marine Boilers have been widely used by the U.S. Navy. Built to meet limitations of shipboard space. 6 models. 800 to 7,500 lbs. of steam per hr. All models burn Diesel oil.



CYCLOTHERM (CW) HOT WATER LINE

Cyclotherm pioneered the construction of Packaged Hot Water Generators, specifically designed for forced circulation systems. The Cyclotherm Hot Water Generator has broken away from principles of steam design and is a true hot water boiler. Available in 10 models; 670,000 to 6,700,000 BTU per hr.

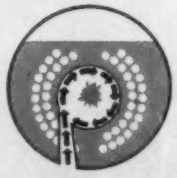


CYCLOTHERM (CE) LINE

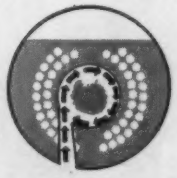
Newest Cyclotherm line . . . 15 to 60 HP . . . built for requirements of Wholesaler, Contractor and Original Equipment Manufacturer. For the first time, a low-priced quality boiler in the small packaged-boiler field.

Here's how Cyclonic Combustion Operates-

1. At a tangent, air is injected into the cylindrical combustion chamber at a velocity of up to 200 miles per hr. The air mass assumes a cyclonic shape and motion in the firetube.



2. Seconds later, the fuel . . . oil or gas . . . is injected into the hollow center of the air mass. Co-ordinated ignition provides immediate combustion with maximum safety.



3. After ignition the atomized fuel vaporizes, forming a swirling vortex of flame that spirals the entire length of the furnace. A thin layer of air separates flame from furnace.

Packaged Boilers

with exclusive *Cyclonic Combustion*

Give You More Power, Performance and Production From Less Investment, Space and Fuel!

Whether in industrial boilers . . . marine boilers . . . hot water boilers or in the new CE boilers just off the production line . . . every Cyclotherm incorporates the exclusive, patented principle of Cyclonic Combustion. And only a Cyclotherm can give you the advantages that Cyclonic Combustion offers.

Cyclonic Combustion results in complete and perfect diffusion combustion of gas and liquid fuels. The cyclonic action of the flame accounts for 65% to 70% heat transfer in the firetube with 15% to 20% additional transfer in the return tubes. No other combustion method can equal the heat transfer obtained with Cyclonic Combustion — and heat transfer is the ultimate measure of boiler efficiency.

Up to ⅓ Smaller

Cyclonic Combustion makes possible the simplified design of Cyclotherm Packaged Boilers, giving you maximum capacity from minimum space. By adding Cyclotherms as you need them, you can easily keep pace with plant expansion and increased steam requirements.

Dual Fuel Systems

Cyclotherms are designed to operate efficiently on either oil or gas. A combination fuel system can be furnished to allow you to take advantage of fluctuations in fuel supply or price. Cyclotherm's design squeezes all the latent energy from every molecule of fuel burned.

Easy, Low Cost Installations

With five simple connections—steam, electricity, water, fuel and stack—Cyclotherms reach your plant ready to operate. You don't need special foundations or expensive stacks. Your regular maintenance personnel can operate any Cyclotherm.

Assured Safety

Cyclotherms are built under highest quality control standards, meet ASME and National Board of Boiler and Pressure Vessel Inspectors requirements, carry Underwriters' Laboratories label. In case of an interruption in fuel supply or breakdown in the electrical control circuits, Cyclotherms "fail safe."

New...Just Completed... For Engineers Only!

A sound-film, in full color, CYCLONIC COMBUSTION AND HEAT TRANSFER, which explains every detail of Cyclonic Combustion. This is not a promotion piece; it is a serious study of combustion principles, written by engineers and intended for engineers only. Write for full information on how your engineering staff or society can see this mathematical demonstration of what Cyclonic Combustion does. Just tear off the corner of this ad and clip to your letterhead—we'll do the rest.

4. With a 65-70% heat transfer in the firetube and 15-20% heat transfer in the return tubes, a minimum of 80% efficiency is the result.

YEARS AHEAD IN STEAM & HOT WATER GENERATION

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Looking for cost leaks? Look at your steam traps

Engineering approach to steam trapping can save thousands a year on costs of fuel, trap maintenance, process cycle time, and uniformity of product quality

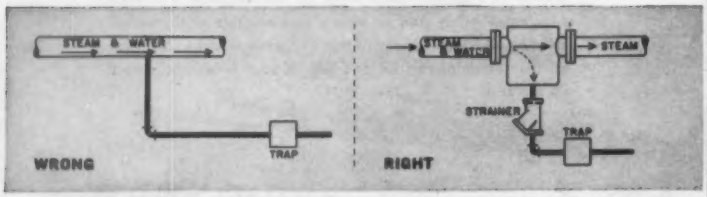
Plant and process engineers all across industry have found that Sarco *Production-Planned* steam trapping can pare operating costs by thousands of dollars a year.

Production-Planned steam trapping is an engineering approach to the problem of getting full design values of heat transfer from steam using equipment. Scores of case histories show that it can make substantial savings and improve processing efficiency. At the same time, costly trap maintenance can be greatly reduced.

In Sarco *Production-Planned* steam trapping, traps are matched to the job by *type* as well as size. They are properly placed, correctly installed. And, to keep down maintenance and replacement costs, every trap is top-quality.

It may pay you well to take this engineer's-eye view of *your* steam trapping. And why not have a Sarco representative look over your system with you? His suggestions will be completely objective because Sarco—and only Sarco—makes a steam trap for every basic requirement. Quality? Recognized everywhere for half a century.

Production-planned systems make best use of traps



As the two illustrations above show, correct application of steam traps is as necessary as using the right trap. In the hook-up on the left, the lack of a condensate collection point plus the long leg to the trap will result in condensate's flowing past the drain point, possibly causing water hammer. The correct way to install the trap is shown at right, placed close to the drain point. A *strainer* should be placed before *any* trap to prevent entrance of scale or other foreign matter into the trap.

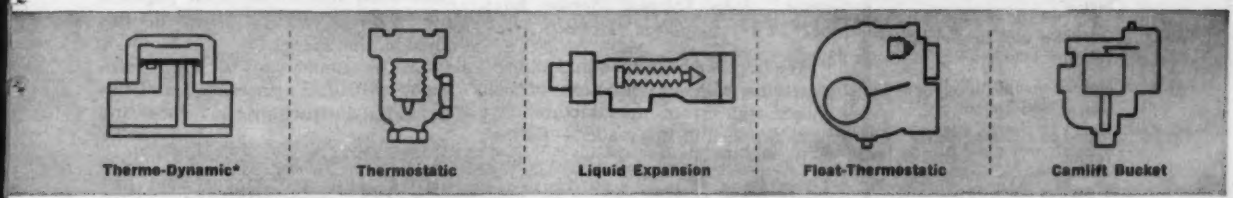
This is just one example of the way your Sarco representative can help you plan your steam system for maximum production.

Traps must be matched to job for best system performance

No single type of steam trap will perform well in all applications. Each type has a range of applications for which it is best suited. For optimum efficiency these differences must be taken into account; traps must be chosen for their operating principles as well as their size and pressure rating.

Sarco can give you impartial help in selecting traps because only Sarco makes the five basic types. With Sarco, it's simple —one source, one responsibility, for all your trapping needs.

Only Sarco makes these five basic types of steam traps



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Take these two steps to Production-Planned steam trapping:

(1) Write today for Sarco literature; (2) Talk with your Sarco representative. He can help you check your trapping requirements, and he has—or will quickly get—the right answer to any unusual trapping problem.

*T.M. U.S. Pat. No. 2,817,353

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FM-9	Molybdenum Disulfide and Glass-Filled Teflon
FM-10	Mica- and Glass-Filled Teflon

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BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

Balancing Fan Wheels

PLANT ENGINEERING:

"The PLANT ENGINEERING August, 1959 issue carries an article entitled 'Here's How To Field-Balance Fan Wheels,' by A. M. Wilbur. The article appears on pages 110 through 113.

"If you have reprints of this article available, we would appreciate it very much if you would send us a few copies." *F. W. McKenna, Chief Engineer, Kennard Div., American Air Filter Co., Inc., St. Louis, Mo.*

PLANT ENGINEERING:

"This will refer to your article, 'Here's How To Field-Balance Fan Wheels,' on page 110 of PLANT ENGINEERING, August, 1959, which I have read with much interest.

"We have several fans on our properties that need to be balanced periodically and I am sure that the information contained in this article would be of much value to some of our maintenance people.

"I would appreciate your sending me 10 copies of this article, provided it is available, without cost to us." *S. M. Dameron, Assistant Manager of Engineering, Island Creek Coal Co., Holden, W. Va.*

► This article has not been reprinted by PLANT ENGINEERING, but tear sheets are still available.—*Editors.*

Smokestack Maintenance

PLANT ENGINEERING:

"Please send any information on smokestack inspection, repair and painting, also on cathodic protection. Please send a list of contractors who furnish reliable service for these items." *John Schmidt, Senior Engineer, Chrysler Corp., Detroit, Mich.*

► We hope we have answered all these questions with the selection of tear sheets and list of manufacturers we have supplied to this reader.—*Editors.*

Filter Code

PLANT ENGINEERING:

"In a most excellent article in the August, 1959 issue of PLANT ENGINEERING, by P. M. Tester on 'Which Filter Where?', there is a reference to the Air Filter Institute code which uses an 'absolute filter' to catch all dust that escapes the test filter. I should like to receive a copy of this code or reference to where I might secure a sample and would have written directly to Mr. Tester, except that I was not certain that the address given at the head of the article was sufficient to have reached him. Perhaps you would be kind enough to forward my letter to Mr. Tester for me." *Walter W. Kenyon, Vice President, Millipore Filter Corp., Bedford, Mass.*

► We have forwarded this letter to the author, but for those who would like to get in touch with the institute direct, the person to write to is Mr. A. Nutting, Secretary, Air Filter Institute, 215 Central Ave., Louisville 8, Ky.—*Editors.*

Writing Pl.E. Operating Manual

PLANT ENGINEERING:

"I have taken on the responsibility of writing an operating manual for a Plant Engineering and Utility Department of Lamp Division of General Electric Co.

"The manual would contain in addition to pertinent material, the following:

"1. An introduction describing the position of Plant Engineering and Utilities in the Division Organization, its principal functions and responsibilities and its relationship to other departments of the company.

"2. A copy of the organization chart showing its composition and personnel.

"3. A functional chart which would show the kind of engineering and maintenance each unit would be responsible for providing.

"4. Pictures of the manager and staff. Position guide and description have been written for each position, but will not be published in this manual.

"5. A sample copy of each form used by Plant Engineering and Utilities with instructions on when and how to use.

"6. Standard routines for handling each type of project for both new construction and maintenance, including: a. Investigations, surveys; b. Job assignments; c. Contracts; d. Purchases; e. Leases; f. Approvals; g. Cost controls; h. Field supervision.

"7. The responsibility of supervisors for personnel work, hiring, salary reviews and escalations, removals, transfers, etc.

"8. A small section devoted to

paint on "minimum maintenance"

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Aluminum paint prevents rust and corrosion... provides superior heat protection

Aluminum flakes rise to the surface of a coat of aluminum paint—forming a solid metal shield that moisture and corrosive gases just can't penetrate. Decay and deterioration are drastically reduced. And paint made with Reynolds Aluminum Pigment holds heat in, increases efficiency. It's the coating that puts a *metal shield* over any surface. *Reynolds Metals Company, P. O. Box 2346-PL, Richmond 18, Virginia.*

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–quality installation
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galvanized steel,
aluminum,
stainless steel)

8 basic fence designs
6 gate styles

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by specialists

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Good fences–since 1883

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BACKTALK—FORETHOUGHTS

customers as a guide to processing requests for service.

"9. General scope of work under responsibility of maintenance, describing service to be furnished under their budget and that work for which separate charges will be made.

"Briefly, it would be a day-to-day operating procedure guide as well as a manual for customers requiring services of this nature.

"Would you be so kind as to inform me if any material of this kind has appeared in PLANT ENGINEERING which would aid or guide me in completing this self-assigned project." *H. M. Filkins, Manager, Plant Engineering and Utilities, Large Lamp Dept., General Electric Co., Nela Park, Cleveland, Ohio.*

► While we do not publish material on every subject mentioned by Mr. Filkins, we have sent him a selection of articles from past issues and other material which we hope will be helpful in his assignment.—*Editors.*

Busways and Grounded Equipment

PLANT ENGINEERING:

"We compliment Mr. W. J. Neiswender on the article, 'Why Grounding Pays' in your July, 1959 issue. We, as a busway manufacturer, wish to correct a possible reader conclusion that we may not be concerned about the effectiveness of busway enclosures as a link in the equipment grounding circuit. We definitely are!

"Our busway, both feeder and plug-in feeder, is available with a separate bus bar within the enclosure and bonded to each section . . . We believe this busways grounding practice offers adequate low impedance grounding to pass fault currents of sufficient magnitude to operate overcurrent protective devices and promptly disconnect potentially hazardous voltage from accessible grounded equipment.

"We would like to have 500 reprints of this article." *E. T. Carlson, General Manager, Electric Distribution Products, Inc., Allentown, Pa.*

Instant Steel

PLANT ENGINEERING:

"I read with much interest your article in the July, 1959 issue entitled 'Instant Steel as an Aid to Maintenance.' Would you please give me the address of the firm to whom I should write for further information." *A. W. Allison, Jr., Maintenance Supt., West Virginia Pulp and Paper Co., Charleston, S. C.*

PLANT ENGINEERING:

"Will you please advise us whom to write regarding the article on 'instant steel' or the Madrigal method, which was mentioned in the July, 1959 PLANT ENGINEERING." *N. H. Benscheidt, The Western Food Products Co., Inc., Hutchinson, Kansas.*

PLANT ENGINEERING:

"Please send any additional information on the instant steel article on page 92 of the July issue, also a reprint of same." *S. J. Walko, Sales Engineer, Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich.*

► Frank Madrigal, the discoverer of the process, has all the information. Letters may be addressed to him c/o International Ore Processing Co., 10918 Vanowen, North Hollywood, Calif.—*Editors.*

Tear Sheets and Reprints

PLANT ENGINEERING:

"The July issue of PLANT ENGINEERING magazine was especially interesting and I would appreciate your sending me one reprint of your article, 'Incinerator Teams Up with Waste-Heat Boiler To Save Money' and six copies of your 'Construction Cost Estimating, Part 1—Concrete Foundations.'" *R. W. Wolfe, Plant Engineer, Visking Co., Terre Haute, Ind.*

PLANT ENGINEERING:

"Would you please send to me, at your convenience, two reprints of the following articles that were in your August 1959 magazine: 'Here's What PVC Piping Offers,' and 'Latex Paints Go Outdoors.'" *R. O. Lewis, Sr., Engineering Dept., Chas. Pfizer & Co., Inc., Groton, Conn.*

Another Inquiry on Rocket Power for Industry

PLANT ENGINEERING:

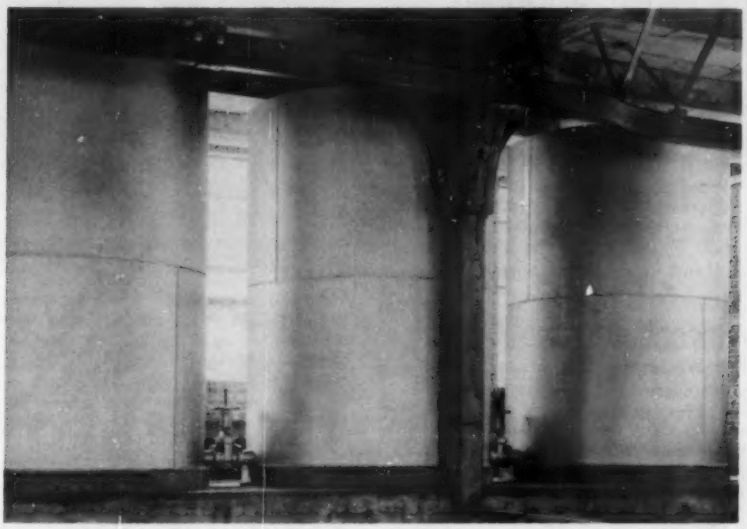
In the June, 1959 issue of PLANT ENGINEERING you published an article entitled 'New Maintenance Tool—Rocket Power.'

"The article stated that prime mover rockets were commercially available for use as freight car movers.

"I would appreciate whatever information you can supply concerning these rockets including the name of a manufacturer whom we can contact." *Ross R. Monroe, Area Supervisor, Carbide and Carbon Chemicals Co., Div. Union Carbide and Carbon Corp., Torrance, Calif.*

BYERS GUIDE

Maintenance and Operating Tips from A. M. Byers Company VOL. 1 NO. 4



These welded Wrought Iron tanks, 9' dia. by 12' high, were installed in 1936 in the chlorine storage building at the Coney Island Sewage Disposal Plant, Brooklyn, N. Y. Steam heating coils suspended in the caustic tanks are also Wrought Iron. During all these years, not a nickel's worth of replacement was needed.

4-D Wrought Iron Curbs Corrosive Caustics, Lasts 2-4 Times Longer Than Other Metals

Two types of metal deterioration prevalent in caustic soda handling have been effectively curbed by 4-D Wrought Iron. Let's discuss the nature of this deterioration and consider an economical remedy.

Caustic embrittlement stymied

This is an intergranular type of stress corrosion. Sounds the death knell for many metals. Cracks suddenly develop along the grain boundaries of the metal. There's little or no warning. They occur on exposure to heated caustic solutions, usually in areas where the metal has been stressed.

Crevices where caustic tends to concentrate are also particularly vulnerable to attack. Service reports indicate that 4-D Wrought Iron possesses excellent resistance to this type of corrosion.

Normal corrosion stalemated too

This is a loss-of-metal type of deterioration. You run into this particularly when the metal's exposure to caustic soda is interrupted by periods of exposure to air, water or neutral solutions. Severity of corrosion depends on temperature and concentration. Over 250,000 glasslike iron silicate fibers per cross sectional square inch of 4-D Wrought Iron—distributed throughout the highly refined base metal—help halt and diffuse corrosive attack.

Heated, concentrated caustics tougher on most ferrous metals

Heated and/or concentrated caustic solutions become increasingly corrosive to most ferrous metals. It takes a silicate-based metal like 4-D Wrought Iron to combat this type of corrosion effectively. That's why design and maintenance engineers are turning more and more to 4-D Wrought Iron pipe and plate for caustic soda heating tanks and heating piping used in caustic processes. Clip coupon for case history service reports.

In Nuclear Equipment 4-D Does Not Distort Radiation Measurement

Manganese and carbon become excited or "stay alive" in a radioactive environment. 4-D Wrought Iron's *low* manganese and carbon content and *low* total metalloid content enable it to perform mechanical functions in nuclear processes without distorting radiation measurement. Check corresponding box in coupon for more information.

Manganese Wrought Iron Resists Impact When Cold

A new specialty wrought iron has been developed for use as an economical, impact resistant metal for low temperature design.

You can use Mn Wrought Iron in the petroleum, chemical and refrigeration industries and others in which brittle failure is giving trouble. It's available in pipe, plate, other forms. Clip coupon for details.

Lower Tubing Costs

Cold drawn 4-D Wrought Iron heat exchanger and condenser tubing is virtually unaffected by ammonia, carbon dioxide and Freon. 4-D tubing lasts longer than steel in salt water, heat transfer brines, and industrial cooling waters. In most tubing applications, 4-D costs less per foot per year of service than other tubing materials. Check coupon for proof.

A. M. Byers Company
Product Development Department
Clark Building, Pittsburgh 22, Pennsylvania

Please send data on items checked:

- ☐ Caustic Soda Handling
- ☐ Nuclear Process Equipment
- ☐ Mn Wrought Iron
- ☐ Condenser and Heat Exchanger Tubing
- ☐ PVC Pipe for Machine Tool Equipment
- ☐ Colorized Wrought Iron
- ☐ Laboratory Test Results
- ☐ Block Rack Construction

Name.....Title.....

Company.....

Address.....

BYERS GUIDE

Hex bar fits snugly in feed rack after liner is in place, so that no adhesive bonding agents are necessary.

New Design Idea* Muffles Noisy Machine Clatter

A new idea for muffling the clatter of machine tool equipment while in operation has been developed by A. M. Byers Company.

Recently a patent application* was made for the new idea which involves lining the bar guide or feed rack on automatic screw machines, turret lathes, etc. with PVC Pipe.

Noise is virtually eliminated and nicking or scratching of bar material is impossible. Some manufacturers have found that the metal feed rack can be replaced with PVC entirely on certain equipment such as engine lathes.

The original test installation of PVC Pipe in this application has been going strong for 10 months with no sign of trouble. And the cost of lining or replacing the feed rack with PVC Pipe is phenomenally low. It's less than $5.00 on single feed machines.

For more details on this one, check the coupon and mail to us.

*Patent pending, A. M. Byers Company

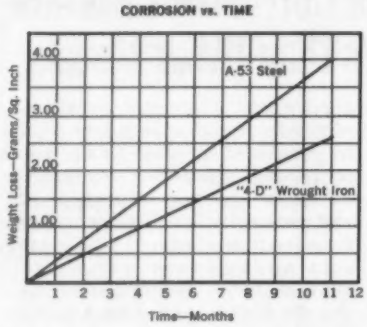
Soot-Blowers Use 4-D To Combat Oxidation

Blowing soot with steam or air tests the temper of the toughest metals. Oxidation is a constant threat, especially to fire tubes. Some metals flunk such hot-again, cool-again tests of endurance. But not 4-D Wrought Iron. 4-D can be furnished *calorized* to resist corrosion at high temperatures (1000—1600°F) prevalent in this service. Fill out coupon for more details.

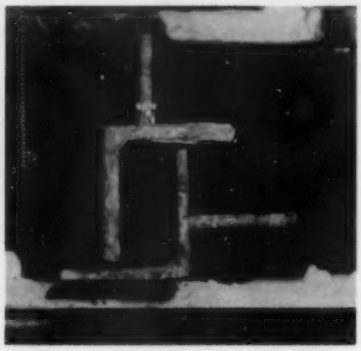
Lower Corrosion Rate For 4-D Wrought Iron

Data for 4-D Wrought Iron and steel plot as virtually straight lines, with 4-D Wrought Iron having a lower slope or rate of attack. Curves will flatten with time.

These data indicate that the 4-D Wrought Iron curve will continue to flatten at a lower rate than the steel curve. Other 4-D Wrought Iron test results are available on request. Please refer to coupon.



Here is a comparative laboratory analysis of corrosion losses in aerated salt water. Tests were conducted by A. M. Byers Company metallurgists.



This unretouched photo shows a comparison of 4-D Wrought Iron and steel after in-service testing at Mercier Brick Company, Dearborn, Michigan. That's 4-D Wrought Iron on top. Steel angle rests directly underneath. Both of these angles were ¼-inch thick when placed in service, side by side on the same rack.

Concrete Block Racks: Which Metal Lasts Longer?

If you guessed 4-D Wrought Iron over steel, you're 100% correct. After 11 months—101 cycles—the 4-D Wrought Iron angle has retained its original thickness. But the steel angle has already lost more than half of its original thickness due to extreme flaking and disintegration from corrosion. 4-D Wrought Iron's resistance to corrosive elements in block production processes is characterized by a hard, impregnable surface shield which cannot be flaked. Even with blows from a hammer. You be the judge. Which metal would *you* use in concrete block rack service? Send coupon for new booklet, "Modern Concrete Block Rack Construction."

For additional information on 4-D Wrought Iron, Contact Byers Division Offices in the cities listed below.

The maintenance and operating items appearing in BYERS GUIDE #4 were prepared by the Engineering Service Department of

A. M. BYERS COMPANY

Pittsburgh 22, Pennsylvania

ATLANTA • BOSTON • CHICAGO • HOUSTON • NEW YORK • PHILADELPHIA
PITTSBURGH • ST. LOUIS • SAN FRANCISCO • WASHINGTON, D. C.

4-D Wrought Iron is immediately available and may be obtained through established distributors of Wrought Iron Pipe. Plate, bar, and other flat rolled products may be ordered direct.

Corrosion costs you more than Wrought Iron

Printed in U.S.A.

FEMCO
CUYAHOGA FALLS, OHIO

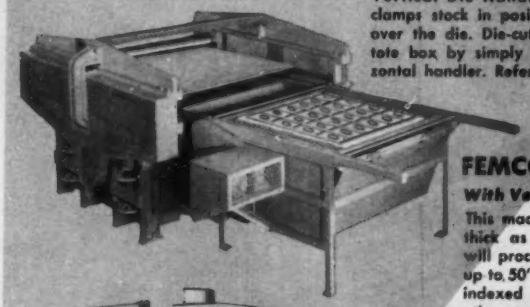
The best way to CUT Production COSTS... is with a FEMCO Die Cutter!

Here are five machines in a QUALITY line of efficient, cost-saving Roller Die Cutters, built by FEMCO, a leader in the field for years.

HEAVY DUTY ROLLER DIE CUTTER

With Vertical and Horizontal Die Handling Mechanism

Cycles up to 6 times per minute excluding loading and unloading time and handles sheet stock materials to 50" wide x 45" deep. Vertical Die Handler precompresses and clamps stock in position before roller passes over the die. Die-cut parts are dumped into tote box by simply inverting frame of horizontal handler. Refer to Model 11304.



FEMCO ROLLER DIE CUTTER

With Vertical Die Handling Mechanism

This machine has die cut foam rubber as thick as 4" with true vertical edges. It will process sheets 50" x 45" or roll stock up to 50" wide. The stock can be manually indexed into positions. Machines in operation are cycling as much as 8 times per minute. Model 11401.

STANDARD AUTOMATIC TRIMMER

Trims entire sheets of molded rubber parts right from the mold, cutting area 29½" x 29½". Parts with two flash elevations can be trimmed. Method for trimming long items which are hard to locate in the Die has been developed. This machine has trimmed up to one thousand pieces per minute. Women can operate this machine. Ask about Model 11006.

AUTOMATIC HEAVY DUTY ROLLER DIE CUTTER

With New Roll Feed Mechanism

Automatic high production output, up to nine cycles per minute with 36" stroke. Quick change die mechanism and easy to thread pinch bar feeder make this machine very efficient on short runs. Feeds roll stock material 60" wide with maximum feed stroke of 70". Other sizes available 38" wide x 38" feed; 50" wide x 45" feed; 81" wide x 81" feed. This is Model 11622.

ROLLER DIE CUTTER

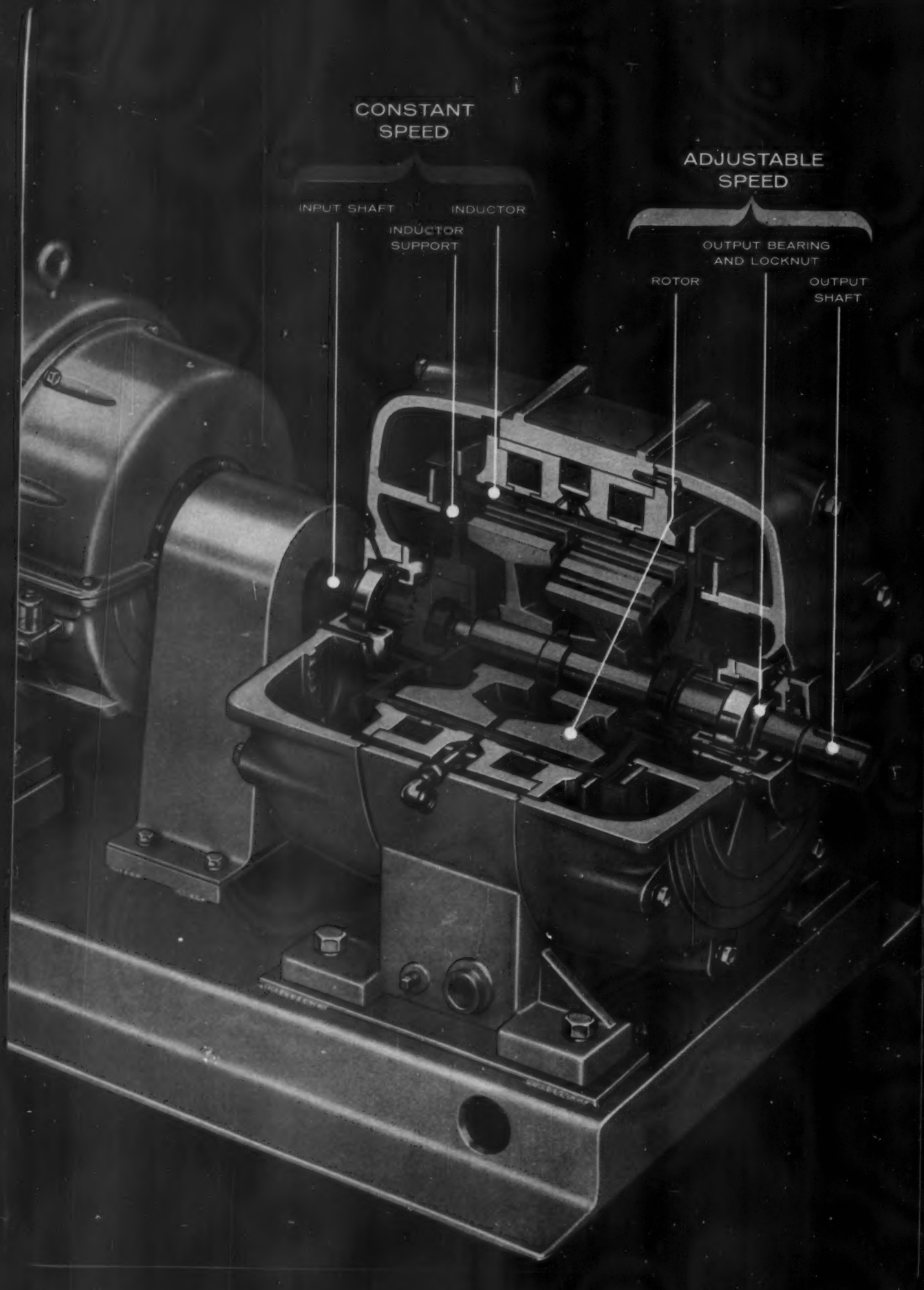
with Twin Horizontal Die Handlers

"Two machines in one." While one die handler is in cutting position, operator on opposite end of machine is unloading and reloading machine for next cutting cycle. Idle or "down" time is eliminated. Controls are arranged so that one die handler can be run independently of the other while dies are being changed. Machine cycles 6 times per minute. Women can operate it. Die cuts sheet material up to 50" wide x 45" deep. Two jobs can be run on machine at same time by using different dies in horizontal handlers. Model 11327.

The FALLS ENGINEERING AND MACHINE CO.
CUYAHOGA FALLS, O.

MATERIALS CUT ON THESE MACHINES include Urethane, Foam Rubber, Curled Hair, Closed or Open Cell Sponge Rubber, Vinyl Foam, Tufflex, Fiberglas, Cotton Batting, Rubber Asbestos, Gasket Materials, Steel Impregnated Asbestos, Cork, Uncured Rubber, Molded Rubber Parts, Vacuum Formed Plastics, Glass Fiber Sheets.

For more facts circle 522 on Reply Card


CONSTANT SPEED
ADJUSTABLE SPEED
INPUT SHAFT
INDUCTOR
INDUCTOR SUPPORT
OUTPUT BEARING AND LOCKNUT
ROTOR
OUTPUT SHAFT

Another new product from Louis Allis

Just a few of many application possibilities:

- Test stands
- Adjustable-frequency sets
- Paper-machine drives, line shaft, sectional, or helper
- Extruder drives
- Rubber and paper calenders
- Wire-drawing machines
- Pumps and blowers
- Kiln drives

The new Louis Allis MAGNETIC DRIVE

A compact, precise adjustable speed drive up to 2000 hp!

If you use adjustable speed drives up to 2000 hp, you ought to know about the special features available in the *all-new* Louis Allis Magnetic Drive. Based on a liquid-cooled magnetic coupling design, this outstanding drive offers you the finest in precise regulation, compactness, and design flexibility.

A unique annular cooling manifold distributes the coolant over the outer surface of the inductor drum to provide an effective heat transfer. "Water drag" is eliminated, since there is *no* liquid in the air gap between the constant speed and adjustable speed members.

This new cooling principle eliminates "flooding" the Magnetic Drive and forcing of water into the bearings. And you'll never find condensation in the bearings, because the annular manifold design permits a planned flow of air through the drive at all times. This reduces bearing temperature and carries away any condensation which might occur as the unit cools off after use.

The design also incorporates stationary field construction, thus eliminating slip rings. All bearings can be easily lubricated without disassembly, and grease chambers provide ample grease reservoirs.

Other features include field coils and lead connections encapsulated in a special chemical and heat-resistant polyester — simplified construction for easy inspection and servicing — and versatile design for simple relocation of cooling inlet, conduit box, discharge, etc., regardless of direction of rotation.

If your plans call for adjustable speed drives — specify Louis Allis Adjustable Speed Magnetic Drive. For a complete description of these new drives, write for Bulletin 3650 — now available at your Louis Allis District Office or from The Louis Allis Co., 434 East Stewart Street, Milwaukee 1, Wisconsin.

Two-field construction shown. Also built in one, three, or four-field construction with or without magnetic brakes. Simply specify your hp and speed requirements and Louis Allis will tailor the drive to your need.

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

LOUIS ALLIS

For more facts circle 523 on Reply Card

A60-138

PLANT ENGINEERS' DIGEST —so those who rush may read and know what's new

Edited by Marjorie E. Weissman

Tape Recorders Cut Lag in Inspection and Completion of Final Estimates of Machine Tool Parts

WHEN A SERIOUS lag built up between stripping a machine tool and examining each part and between examination of parts and completion of final estimates, Newman Industries, Ltd., Yate, England, investigated the possibilities of streamlining the operation.

Investigation showed weaknesses in the labelling, estimating and typing procedures and these were reorganized. In off-peak hours workers in other departments prepared tie-on labels for the stripped parts and the storekeeper was released for production work.

All production parts related to any single machine were stored on mobile, tiered racks and as a machine moved from shop to shop its related parts, which might number 1500, went with it en bloc.

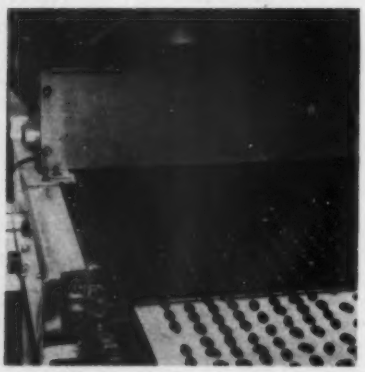
Up to 60 per cent of an estimator's time was being used in writing draft estimates from his rough notes made at the time of inspection of the parts, and in checking the typescript. By using a tape recorder the estimator is able to dictate onto a tape the condition of each part. Tapes are changed at convenient intervals and sent to a typist who transcribes the recorded instructions onto a duplicator master.

Estimator dictates into tape recorder description of parts as he inspects them.

These procedures have succeeded so well that, although they had been intended only as a stop-gap until new estimators were trained, for the present no new staff will be needed. *From Target, published in London, England.*

Antifreeze Solution, Carried in Copper Tubing, Provides Quick, Even Cooling of Hot Candy

TUBED COPPER strip radiant panels used in cooling tunnels have almost halved operating time and doubled output of candy at the Barricini Candy Company, Long Island City, New York.



Cooling solution, carried in black-painted copper tubes, cools the candy evenly.

A continuously-moving belt passes freshly-made hot candy through the tunnels where it is uniformly cooled above and below by the panels. The cooling solution in the tubed copper strip panels, painted black to increase heat absorption, consists of water with propalene glycol antifreeze added. Its temperature is kept at 25-27 F. Aiding the cooling operation is a dehumidifier which keeps moisture out of the tunnel.

Expediting the flow of the cooling solution through the four sections of copper strip in each tunnel are copper tube supply and return lines joined with soldered fittings. These fittings permit easy removal

(Continued on page 40)

NOW a single Condulet® for any make motor starter and circuit breaker!

★TYPE DMC: Dust-Ignition-Proof (Dust-Tight) — National Electrical Code Class II, Groups E, F and G; NEMA Type 9EFG.

★★TYPE WMC: Watertight — NEMA Types 3, 3R, 4 and 5.

UNIQUE COVER HINGING ARRANGEMENT allows DMC-WMC Condulets to be mounted directly adjacent to other Condulets without providing extra space between for cover to hinge open. Cover pulls out, then to either side to clear adjacently-mounted Condulets or other equipment.

CROUSE-HINDS TYPES DMC* AND WMC** Combination Line Starter CONDULETS

DMC-WMC Condulets are designed to accept and operate any of the various makes of motor starters and circuit breakers. Single speed non-reversing combinations are equipped with a universal mounting plate, motor starter reset assembly and circuit breaker operating assembly. No substitutions of any parts on the Condulets are required.

Built-in push-button stations and selector switches with various contact arrangements, pilot lights and control transformers can be supplied. Push-button and selector-switch operating shaft holes and pilot-light holes may be drilled, tapped and plugged for future use.

Separate mounting lugs are bolted on body. A center position is provided on back of body so that lugs can be attached for 3 point suspension or center pole (2 point) mounting. Circuit breaker handle has provision for padlocking in "On" or "Off" position.

WRITE for descriptive literature and specifications . . .
or contact your Crouse-Hinds distributor.

CROUSE HINDS

MAIN OFFICE AND FACTORY: SYRACUSE, NEW YORK
Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.
Crouse-Hinds Instrument Company, Inc., Silver Spring, Maryland

● CONDULET® ELECTRICAL EQUIPMENT (Explosion-Proof and Conventional) ● FLOODLIGHTING
● TRAFFIC CONTROL SYSTEMS ● AIRPORT LIGHTING and WEATHER MEASURING EQUIPMENT

These products are sold exclusively through electrical distributors. For application engineering help, contact one of the following offices: Atlanta Baton Rouge Birmingham Boston Buffalo Charlotte Chicago Cincinnati Cleveland Corpus Christi Dallas Denver Detroit Houston Indianapolis Kansas City Los Angeles Milwaukee New Orleans New York Omaha Philadelphia Pittsburgh Portland, Ore. St. Louis St. Paul Salt Lake City San Francisco Seattle Tulsa Washington
Resident Representatives: Albany Baltimore Reading, Pa. Richmond, Va.

For more facts circle 524 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

of a section of tube without dismantling the tunnel.

To maintain a constant pressure in the panel sections, the supply lines are graduated in size. The entry line is 1¼ in., the line for the first two sections is 1 in., and the line for the last two sections, ¾ in. Reverse order holds for return lines. *From Copper and Brass Bulletin, published by Copper & Brass Research Assn., New York 17, N. Y.*

Reducing Storage Rack Corrosion

PLANT ENGINEERS at Tampa Sand & Material Co., manufacturers of cement blocks, have experimented with many means of reducing corrosion in racks used for handling loads of cement blocks in and out of autoclaves.

These methods include chemical treatments and galvanizing, but coating the racks with a simple slurry of phosphorus dust and cement has proved successful.

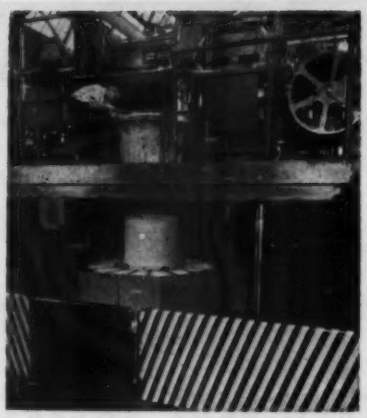
With this slurry coating, racks have undergone 200 operational cycles with no sign of corrosion. Ordinarily, corrosion would be present on the chemically treated racks after five cycles while 10 cycles would produce serious pitting of the galvanized racks.

Another economy is the use of chain for tying trains of racks together. Cable formerly used showed damage after 10 days' use. Experience so far indicates that the ½-in. chain will stand up indefinitely. There is also less trouble with sagging and slack. *From The Water Tower, published by Chicago Bridge & Iron Co., Chicago, Ill.*

Lift Makes Work Accessible

TOWERING OUT of reach of the operators, large aluminum castings being machined in our plant posed difficulties both in machining and gaging. Several possible measures to get the operator where he was needed were discussed and discarded, but the idea of a movable platform was found acceptable. Our plant engineering department drew up specifications for a suitable platform lift which was made for us by Globe Hoist Co.

The lift measures 15 ft long by 5 ft wide, and has a cut-out section on its front edge which conforms to the shape of the vertical turret lathe. Two hydraulic rams can raise the platform to a maximum of 8 ft. The shafts supporting the rams and platform are 13 ft deep.



Aluminum casting can be easily checked by operator from raised platform. Revolving drum, right, holds blueprints.

Power is supplied by a 5-hp electric motor that operates a hydraulic pump and the platform has a removable pipe railing which, together with chains, completely encloses the lift for operator safety.

Controls, mounted on the lift itself, allow the operator to make adjustments in the height of the lift and position it at any point along its 8-ft travel.

Two telescoping bridges can be cranked out from the cut-out section of the platform when it is in the raised position to allow the operator to move in closer to the workpiece to adjust tools or gage the casting. As the platform descends, the bridges are manually retracted to clear the casting and the base of the machine. *From The Power Plant, published by Pratt & Whitney Aircraft, Div. United Aircraft Corp., East Hartford, Conn.*

Parking Squeeze Solved by Rooftop Facility

Rooftop parking for about 100 cars was provided as part of remodeling program at PPG's New Orleans warehouse. New loading docks were built, below, right. (From PPG People, published by Pittsburgh Plate Glass Co., Pittsburgh, Pa.)

New Footrest Reduces Fatigue

FOOTRESTS, newly-designed and made in our mechanical maintenance and machine repair department have been installed at more than 125 punch presses throughout the works. Designed so that it can be fastened to the floor and swung under the press legs when not in use, the new footrest provides a firm support that can be adjusted for length or height to fit varying heel styles and shoe sizes.

The old type of cast iron footrest

He's mopping up the mess for the last time

At a leading aircraft research center, high-frequency vibration caused severe oil leakage from hydraulic lines servicing a huge wind tunnel. Many man-hours each month were wasted cleaning up the basement floor underneath, even though drip pans were used extensively.

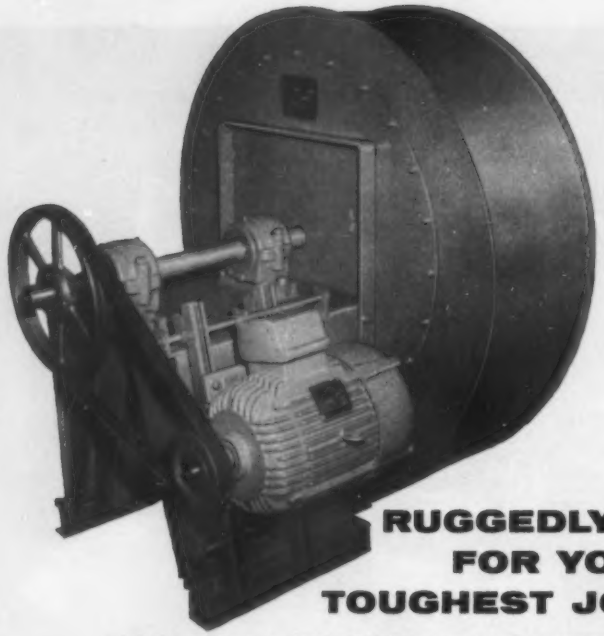
Now, after a change to a Suntac oil, the vibration-caused leakage has been reduced to a point where "mop-up" is not needed. Hydraulic-fluid consumption has been cut by 4000 gallons a year. That's economy! That's Sun quality—the best economy of all.

If your plant is troubled with a leaky system, a Suntac antileak hydraulic oil can save you money, too. Ask your Sun representative to show you the Suntac desk-top demonstration, or write direct to SUN OIL COMPANY, *Philadelphia 3, Pa., Dept.* **PY-11**. *In Canada: Sun Oil Company Limited, Toronto and Montreal.*

SUNOCO

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

For more facts circe 525 on Reply Card



RUGGEDLY BUILT FOR YOUR TOUGHEST JOBS!

"BUFFALO" INDUSTRIAL EXHAUSTERS

Heat Slinger Cools Shaft on Hot Gas Exhauster.

HANDLING HOT GASES:

Heavy-duty, peak efficiency "Buffalo" Industrial Exhausters are ruggedly built to withstand such severe service as hot gas applications. Heavy steel plate housing is welded throughout. High performance is the result of smooth air flow design. Constructions are available for temperatures up to 850° F.

"Buffalo" Rubber Lined Exhauster

REMOVING CORROSIVE FUMES:

"Buffalo" Rubber Lined Exhausters have proved highly successful in handling corrosive fumes. Users report that they stay on the job up to 12 times longer than ordinary metal fans. "Buffalo" Industrial Exhausters are also available in special metals and resin-bonded fiberglass to handle most corrosive fumes.

Type "MW" Material Wheel

MOVING MATERIALS:

Special all-welded material wheels can be furnished with "Buffalo" Industrial Exhausters. The front flange type handles most materials conveyed by pneumatic systems: emery dust, saw dust, chips. The open type wheel efficiently handles long shavings and stringy materials.

For complete facts on "Buffalo" Industrial Exhausters, call your "Buffalo" engineering representative. Or write for Bulletin FI-110.

BUFFALO FORGE COMPANY

Buffalo, N. Y.

Buffalo Pumps Division • Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

VENTILATING • AIR CLEANING • AIR TEMPERING • INDUCED DRAFT • EXHAUSTING
FORCED DRAFT • COOLING • HEATING • PRESSURE BLOWING

For more facts circle 526 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

Shop-designed footrest reduces fatigue of our women punch press operators.

was not permanently fastened to the floor because of potential stumbling hazard. *From The Microphone, published by Western Electric Co., Hawthorne Works, Chicago, Ill.*

Epoxy-Resin Punch Facing

AN EPOXY-FACED punch is being used in a draw die operation for stamping ambulance roofs at Richard Brothers Division of Allied Products Corp., Eaton Rapids, Mich.

The punch consists of a zinc alloy core faced with ⅜-in. (plus or minus ⅛ in.) of epoxy resin. This is cast in liquid form between the metallic core and a plaster mold positioned properly to provide the necessary clearance. Use of a parting agent on the mold facilitates separation from the hardened plastic.

The epoxy resin hardens with negligible shrinkage to the shape of the plaster which is a duplication of a master model.

Use of epoxy-resin facing has

Epoxy-faced punch with zinc alloy core stamps 4000 ambulance roofs annually.

For more facts circle 527 on Reply Card →

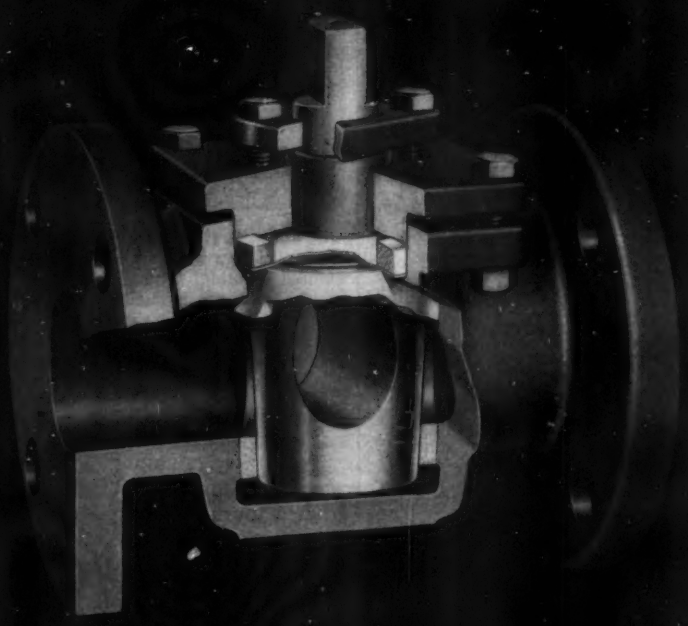
Put a Teflon® sleeve in the body **insert a plug**

add a diaphragm, **a gasket** **and a thrust**

collar, secure the cap and the **self-aligning adjuster,**

and you've got a non-lubricated, trouble-free plug valve.

This is the new Type G DURCO SLEEVELINE



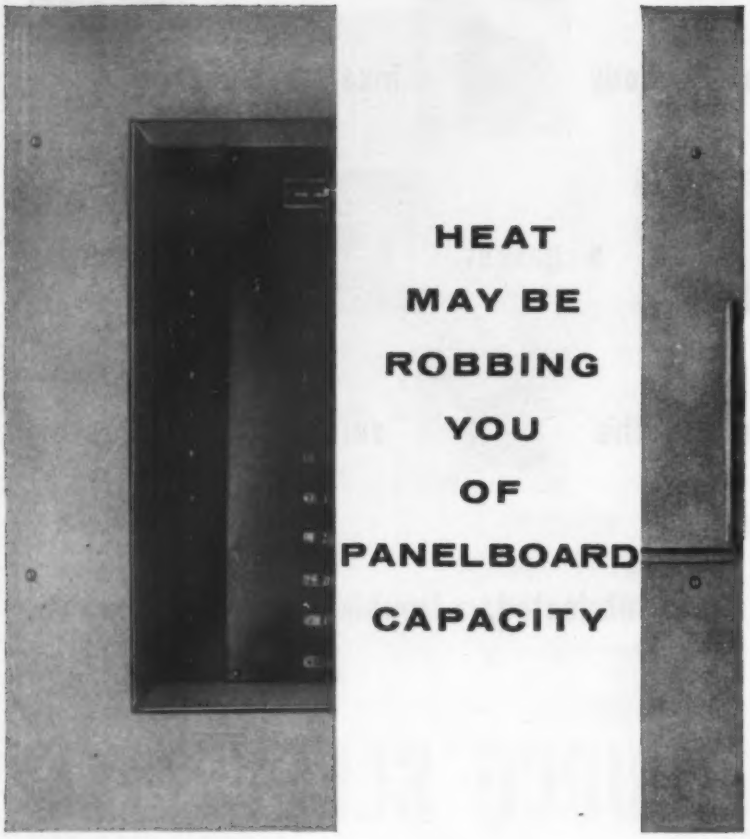
ductile or stainless
screwed or flanged
1/2" to 2" sizes

ductile flanged
sizes to 6"

150 psi rating
write for Bulletin V/12

DURCO

THE DURIRON COMPANY INC., Dayton, Ohio / Valves • Pumps • Filters • Process Equipment



If fuses blow inexplicably or breakers trip seemingly without cause . . . heat may be the hidden trouble-maker. Heat can trick a thermal circuit protector into opening a safe circuit. All it takes is the combination of high ambient temperatures and the inherent electrical heating common to thermal elements.

This cannot happen with the Heinemann circuit breaker.

The Heinemann breaker operates on a hydraulic-magnetic principle; it works on current . . . not heat. Ambient temperature has no effect on current-carrying capacity or set tripping points, so there's no need for compensation or de-rating. The breaker will always carry its full rated load. A 20 ampere rating on a Heinemann breaker means 20 amperes of *usable* capacity . . . under any conditions. And no nuisance tripping, ever.

If you're plagued by "heat happy" panelboards, you'd do well to consider replacement with Heinemann Panelboard Circuit Breakers. Conveniently enough, they're dimensionally interchangeable with many other makes of breakers.

FOR MORE INFORMATION, SEND FOR BULLETIN 3103

HEINEMANN

HEINEMANN ELECTRIC COMPANY *Circuit breakers*

128 Plum Street, Trenton 2, N. J.

For more facts circle 528 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

resulted for this company in economies of approximately 10 per cent. These economies occur through savings of up to 50 per cent in the spotting time required to prepare the punch for stamping the ambulance roofs.

All, or portions, of the epoxy-resin facing can be easily replaced as it becomes worn. The resin is light and easy to handle with no special equipment necessary for mixing and pouring. In addition, the plastic has been found to cling tenaciously to the metallic core and does not react to moisture or moderate temperature changes by variation in its size or shape. *From a release of Ren Plastics, Inc., Lansing, Mich.*

Quick Scrub for Filters

One-kilowatt, six-gallon ultrasonic units clean oil filters in half time required for manual cleaning. Often, $50 filter cannot be cleaned manually, but can be returned to service after ultrasonic scrubbing. (From a release of Gulton Industries, Incorporated, Metuchen, N.J.

Joining PVC Pipe

POLYVINYL CHLORIDE plastic pipe was used for a cold water line from a tower at South Fork, near Johnstown, Pa., to a water connection, on the Pennsylvania Railroad.

The 1½-in. pipe was specified because cinder fills or soils containing cinders form unusually severe corrosive conditions. Leaching action of water passing through

New from Wright!

Built-In Overload Protection for Operator, Load and Hoist with the New Wright Overload Cutoff*!

• Now, for the first time on any electric hoist, you can have safe, sure mechanical overload protection as a built-in feature with the **WRIGHT Overload Cutoff.** Designed and built to fit any new WRIGHT *Speedway* Electric Hoist, the Overload Cutoff unit you see pictured above is a compact, integral part of the hoist frame itself. As a result, it becomes a functional part of the hoist *at no sacrifice in headroom.* The WRIGHT Overload Cutoff is simple in design and should give dependable, trouble-free operation during the entire life of the hoist under normal operating conditions. Calibrated and sealed at the factory for the user's protection, the unit takes rugged abuse up to the critical point of overload—then instantaneously "breaks" the raising circuit of the hoist. This allows the load to be safely lowered to the floor and unhooked. Once this is done, the raising circuit of the hoist is again automatically restored.

The WRIGHT Overload Cutoff is available now as standard equipment on all new WRIGHT Frame 2 & 3 *Speedway* Electric Hoists, and as optional equipment on new Frame 1 & 1½ models.

Find out how WRIGHT *Speedway* Hoists equipped with Overload Cutoff can bring practical, fast-acting overload protection to your material handling operations. For complete information, write our York, Pa., office.

*Patent applied for

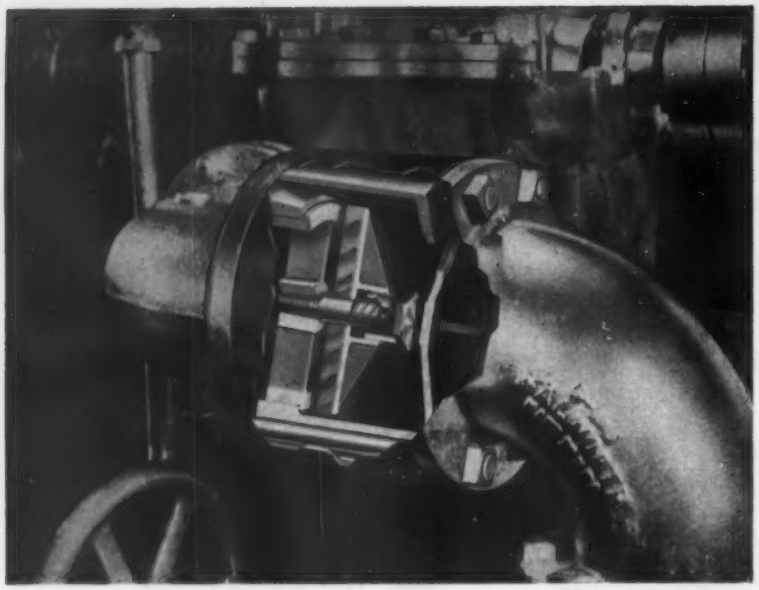
WRIGHT HOISTS

Wright Hoist Division · American Chain & Cable Company, Inc.

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO

For more facts circle 529 on Reply Card



CPV CHECK VALVES ARE SILENT

. . . and this non-slam feature is your *positive* assurance of a silent, safer piping system, with protection to the pump, and other equipment.

Easily installed wherever liquid flows, a CPV Check Valve closes automatically as soon as forward flow stops. The valve is closed before any reverse flow occurs. Dangerous line surges and hammer are eliminated without expensive air cushions, shock absorbers and other devices.

Only CPV CHECK VALVES Give You All These Features

- Straight guided disc with two point bearing assures positive valve seating.
- Helical spring is engineered to close automatically as soon as forward flow stops.
- Ideal for all pressures and temperatures—including high temperature water.
- Available in a wide variety of materials, including Alconite, bronze, steel, stainless steel and monel.
- Easily installed in any position.
- Full radial flow with minimum head loss.
- Approved by Factory Mutual Laboratories for fire lines.
- Choice of four basic types in sizes from ½-in. to 18-in. or more.

Get the full story about CPV Silent, Non-Slam CHECK VALVES. Write today for Catalog C.

STYLE G...2-10"

STYLE GS...6-18"+

STYLE HU...½-2"

STYLE H...½-2"

COMBINATION PUMP VALVE CO.
851 PRESTON STREET • PHILADELPHIA 4, PA.
SOLD BY RELIABLE AGENTS IN PRINCIPAL CITIES
For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

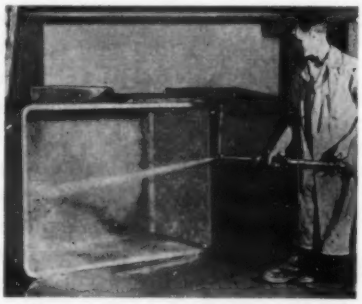
cinder-bearing strata and dissolving out sulfur compounds results in an acid attack. PVC is immune to this type of corrosion.

The railroad maintenance men used the easiest and most reliable method of joining PVC pipe lengths —cementing. They followed these steps in order to assure sound, leak-proof joints in the system:

1. Ends of pipe were cut square to butt fully against shoulders of fittings.
2. Pipe ends and fittings were cleaned with carbon tetrachloride.
3. With clean brush, cement was applied liberally to pipe ends; fittings; including shoulders of fittings; and butt ends of pipe lengths.
4. Pipe was inserted into fittings and given ¼ 90 deg turn. Time lapse from start of cement application to completion of ¼ turn did not exceed two minutes.
5. The fittings were blocked tightly and held in place for several minutes to insure complete bond. Precautions were taken to avoid readjusting pipe or otherwise disturbing joint after ¼ turns were made. *From a release of A. M. Byers Co., Pittsburgh, Pa.*

Food Containers Jet-Cleaned

BY CONVERTING to high-pressure, hydraulic jet cleaning, a Chicago rendering plant solved the problem

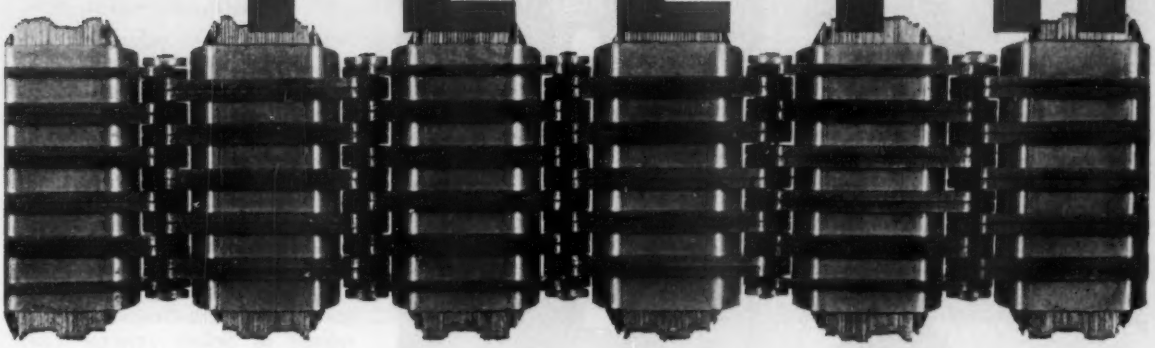


Hot water jet cleans meat buggy at rendering plant. Method cuts rejects.

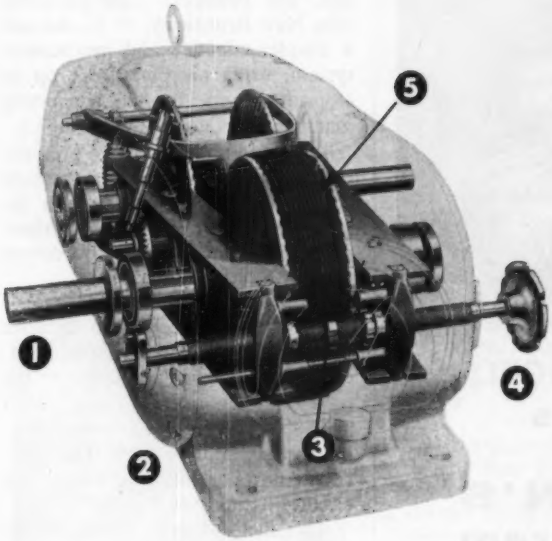
of adequately cleaning its shipping containers. It also saved some $4500 in direct labor costs for the operation.

The plant, operated by Chicago

PUT TEETH



IN YOUR SPEED CHANGING JOBS



Get the positive, accurate control that only LINK-BELT's chain-driven P.I.V. can deliver

Yes, you put teeth into your speed changing jobs because Link-Belt P.I.V.—unlike other variable speed drives—utilizes an exclusive metal, self-tooth-forming chain.

Here's how it works! P.I.V. chain consists of a series of overlapping steel links. The links contain packs of slats which are free to move from side to side, singly or collectively, to serve as teeth. The chain meshes with radially grooved wheels, which are cut to a constant depth towards the wheel periphery. Beveled sides of the grooves offer gripping areas . . . provide a positive, nonslip contact at any speed, under all loads.

Makes changing speed simple too! A turn of the control screw simultaneously varies the effective diameters of the conically shaped wheels—closing one set, spreading the other. At the same time, the self-tooth-forming chain automatically adjusts to provide desired ratio between the input and output shafts.

BOOK 2274—Your Link-Belt office or authorized stock-carrying distributor has Book 2274 on P.I.V. drives from ½ to 25 hp. Refer to the yellow pages of your local phone directory under Power Transmission Equipment.

(1) You can get minute speed changes and maintain them accurately while operating under full load.

(2) All-metal, totally enclosed—unaffected by atmospheric conditions. All vital operating parts splash-lubricated from a common housing reservoir.

(3) Easy-view speed indicator facilitates speed selection and adjustments to meet all requirements.

(4) An infinite number of positive, stepless speed adjustments may be made with manual, electric, pneumatic or hydraulic controls.

(5) Self-tooth-forming chain is made from a series of overlapping steel links. Links contain packs of hardened steel laminations or slats (shown above). Slats grip toothed wheels positively without slippage —give the speed you need at any setting.

15,249

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To serve Industry There Are Link-Belt Plants, Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

LINK-BELT
P.I.V. VARIABLE SPEED DRIVE

For more facts circle 531 on Reply Card

ALL THIS
with

DIAMOND CHAIN'S
Parts Packaging Program

DIAMOND roller chain replacement parts are sealed individually in transparent plastic envelopes, each with an identification card. Heavy overpack boxes labeled with part number and quantity, simplify storage and inventory, provide easier identification and protect against dirt, moisture and abrasion.

Your DIAMOND Distributor stocks all types and sizes of standard roller chains and parts. See "Chains, Roller" in the Yellow Pages . . . or write to: DIAMOND CHAIN COMPANY, INC., *A Subsidiary of American Steel Foundries*, 402 Kentucky Avenue, Indianapolis 7, Indiana. Offices and Distributors in all principal cities.

DIAMOND ROLLER CHAINS ®

For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

Refining Corp., manufactures edible oils, lard and beef fats. Raw fats are collected and refined products delivered in large "meat buggies" and smaller "slack barrels" that require thorough cleaning after each use.

By using this high pressure, hydraulic jet method, they are able to clean 60 buggies and some 130 barrels daily. Formerly this job required two men using scrub brushes and rejects were frequent. *From a release of Sellers Injector Corp., Philadelphia, Pa.*

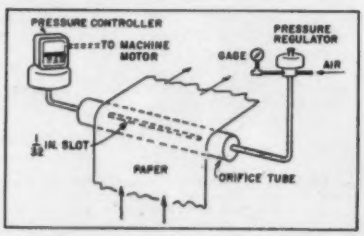
Tear in Paper Stops Motor

COMPANIES PROCESSING paper and similar products employ various methods to reduce sheet-break damage. The Permaeel Tape Corporation, New Brunswick, N. J., devised a simple, effective and inexpensive system, using air pressure drop to stop the motor on the converting machine.

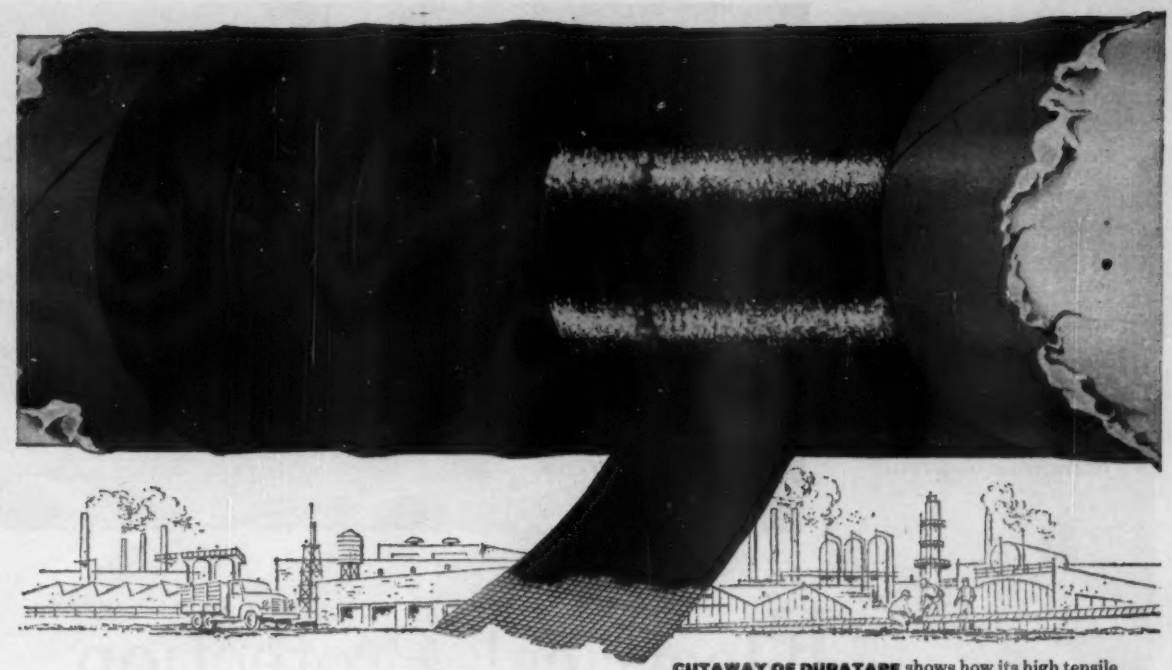
Air is fed under constant pressure through an orifice tube to a pressure controller. This orifice tube is installed under the moving paper sheet which is under tension, and covers the slot, holding the air in.

As long as there is no tear or break, the paper continues to move through the machine without interruption. However, a tear in the paper passing over the slot allows air to escape from the tube, causing the pressure to drop. The pressure controller instantly breaks the circuit to the motor.

This method stops the paper before the tear develops into a complete break. A simple splice can repair the damage. *From Industrial Control News, published by Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.*



Tear in paper releases air in orifice tube, drops pressure, breaking circuit.



CUTAWAY OF DURATAPE shows how its high tensile glass fibers, heavily coated with coal tar or asphalt, provide an extremely durable dielectric shield.

Mill-wrapped pipe lasts only as long as its joints . . . that's why

more and more companies use Johns-Manville Duratape® to protect pipe joints

QUICK, EASY APPLICATION. Simply wrap primed joints with Duratape . . . flash-seal with low-temperature torch during and after application. Wrap can be similarly applied to elbows, tees and other pipe fittings.

J-M Duratape Joint Wrap is designed to give pipe joints the kind of protection they need to live as long as the rest of the pipe. It forms a tough dielectric barrier with excellent resistance to corrosive elements.

Made of high tensile glass fibers, and heavily coated with coal tar or asphalt, Duratape forms a tight bond with the pipe and a lasting seal against corrosion. In many years of actual use, this combination of inorganic glass fibers with coal tar (or asphalt) has proved to be far superior to organic base tapes.

Duratape is also fast and easy to install. This, plus its initial low cost, permits extensive savings on joint-wrapping. No problem with tearing, either, because of its strong, reinforcing glass fibers.

Your nearby Johns-Manville representative has samples and complete information. Contact him, or write to Johns-Manville, Box 158, New York 16, N.Y. In Canada, Port Credit.

WHEN ORDERING mill-wrapped pipe, be sure to specify the J-M "Partners in Pipeline Protection"... Blue Flag® Fiber Glass Wrap for enamel reinforcement with an outer shell of J-M Asbestos Felt . . . for *complete* pipe protection.

JOHNS-MANVILLE

JOHNS-MANVILLE JM PRODUCTS

For more facts circle 533 on Reply Card

THOMAS JEFFERSON BUILDING

Electrical services are fed from two 4,000 amp. main distribution boards. Each of the main switch boards is fed by 8-500 MCM conductors per phase.

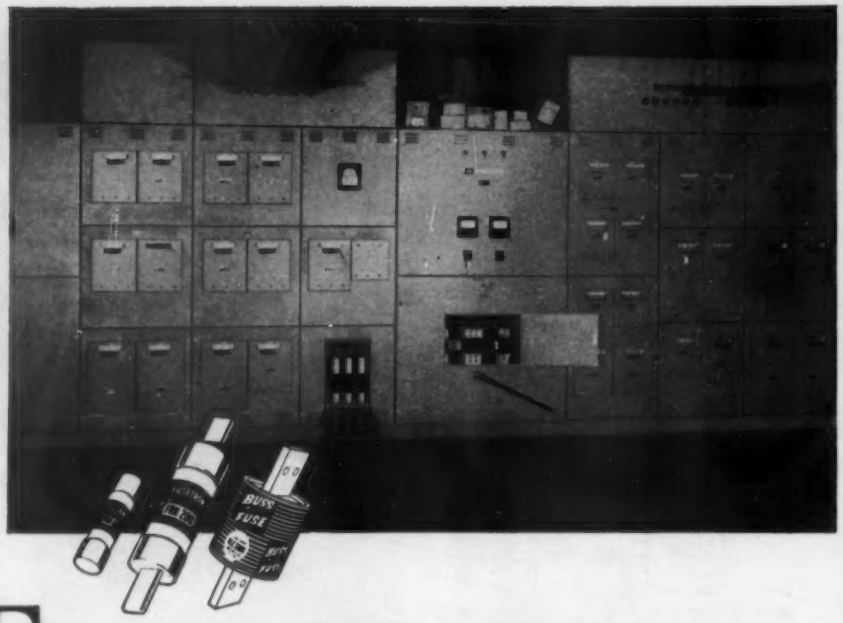
Switch Board #1

Protected by: 3-4000 amp. BUSS Hi-Cap Fuses . . . 12-600 amp., 30-400 amp., 3-200 amp. FUSETRON Fuses.

Switch Board #2

Protected by: 3-4000 amp. BUSS Hi-Cap Fuses . . . 6-600 amp., 33-400 amp., 39-200 amp. FUSETRON Fuses.

All distribution panels protected by FUSETRON dual-element fuses.



Electrical Protection goes MODERN *with* BUSS Fuses

in St. Louis' Newest Multi-Storied Office Building . . .

The Thomas Jefferson Building is another outstanding example of BUSS Hi-Cap and FUSETRON dual-element fuses meeting the requirements for a modern protective device for use in modern electrical systems.

Today's electrical networks, with their tremendous capacities, have emphasized the need for a superior protective device that can be relied on to safely and dependably handle faults of great magnitude.

BUSS Hi-Cap and FUSETRON fuses, because of their high interrupting capacity and life-time dependability have become the natural choice in both new installations and when electrical systems are being modernized.

WHY HIGH-INTERRUPTING CAPACITY AND DEPENDABILITY ARE ESSENTIAL FOR A MODERN PROTECTIVE DEVICE . . .

CAPACITY

The magnitude of fault current is only limited by the capacity of the transformers or networks. These capacities have been increasing yearly — and most likely will continue to increase.

A modern protective device, therefore, must be capable of interrupting faults of 75,000 to 150,000 ampere which are available today — and be adequately safe to allow for future system growth.

BUSS Hi-Cap and FUSETRON dual-element fuses meet this requirement. The interrupting rating of BUSS Hi-Cap fuses is 200,000 rms symmetrical — and for FUSETRON fuses it is 100,000 rms symmetrical.

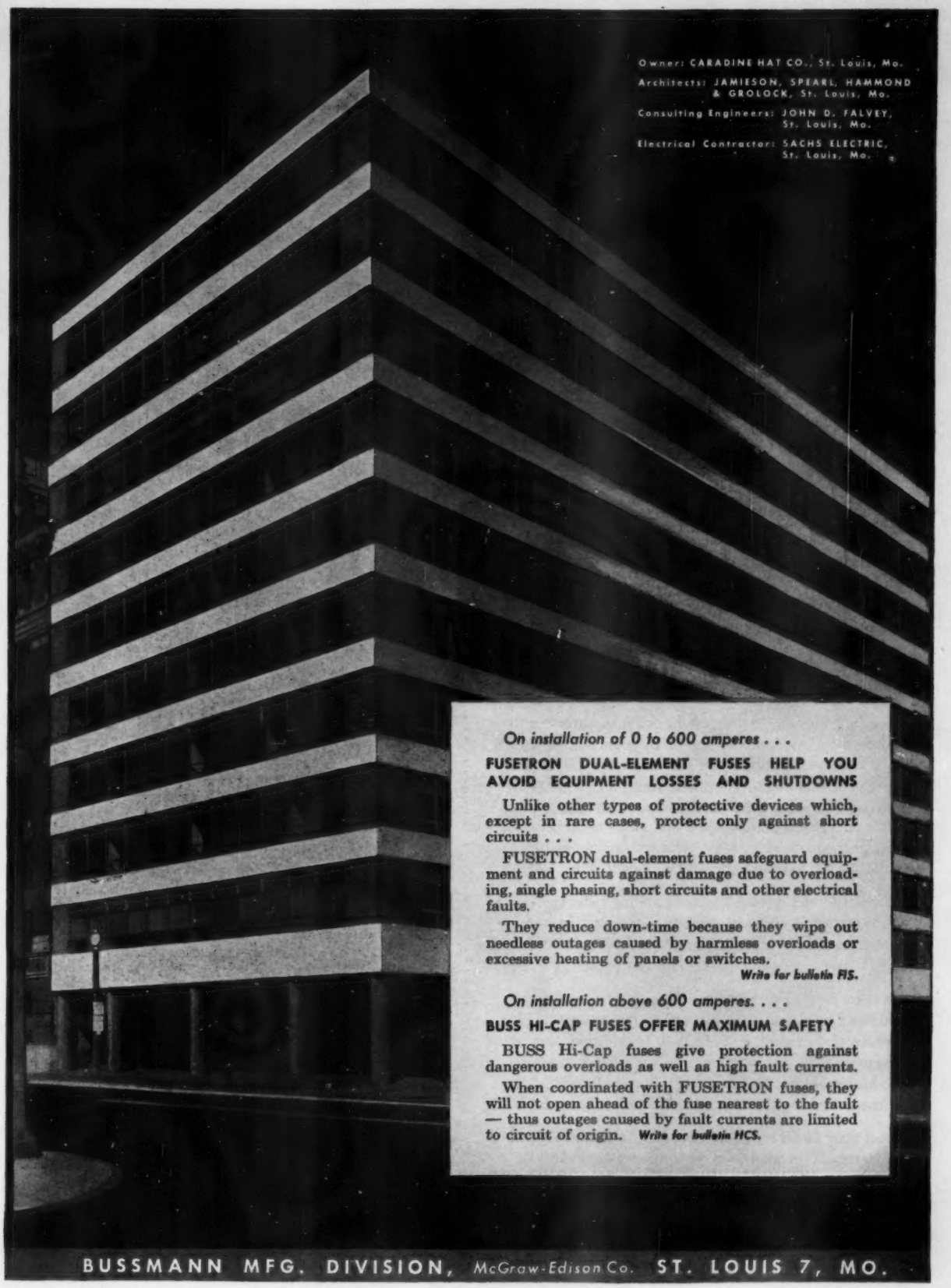
LIFE-TIME DEPENDABILITY

The *Modern* protective device should remain just as safe and accurate through the years as it is on the day installed. Otherwise, how can you be sure it will interrupt these high fault currents should trouble occur 10, 15 or 20 years from now.

This requirement too, is met by BUSS Hi-Cap and FUSETRON fuses — They remain safe and accurate and require no periodic inspection or recalibration, as they have no hinges, pivots, latches or contacts to stick or get out of order.

1159

ANOTHER BUSS HI-CAP AND FUSETRON FUSE INSTALLATION


Owner: CARADINE HAT CO., St. Louis, Mo.
Architects: JAMIESON, SPEARL, HAMMOND & GROLOCK, St. Louis, Mo.
Consulting Engineers: JOHN D. FALVEY, St. Louis, Mo.
Electrical Contractor: SACHS ELECTRIC, St. Louis, Mo.

On installation of 0 to 600 amperes . . .

FUSETRON DUAL-ELEMENT FUSES HELP YOU AVOID EQUIPMENT LOSSES AND SHUTDOWNS

Unlike other types of protective devices which, except in rare cases, protect only against short circuits . . .

FUSETRON dual-element fuses safeguard equipment and circuits against damage due to overloading, single phasing, short circuits and other electrical faults.

They reduce down-time because they wipe out needless outages caused by harmless overloads or excessive heating of panels or switches.

Write for bulletin FIS.

On installation above 600 amperes. . . .

BUSS HI-CAP FUSES OFFER MAXIMUM SAFETY

BUSS Hi-Cap fuses give protection against dangerous overloads as well as high fault currents.

When coordinated with FUSETRON fuses, they will not open ahead of the fuse nearest to the fault — thus outages caused by fault currents are limited to circuit of origin. ***Write for bulletin HCS.***

BUSSMANN MFG. DIVISION, McGraw-Edison Co. **ST. LOUIS 7, MO.**

For more facts circle 534 on Reply Card

Mobilplex ep

The Multi-Service Grease with unique Calcium EP Complex. Never before in a single lubricant such a wide range of use...such a margin of superiority...such a potential for maintenance savings!

Outstanding resistance to the washing action of water, emulsions, caustics and acids is one of the many important properties of Mobil's new multi-service grease—*Mobilplex EP*. In your manufacturing plant, you'll find it protects bearings exposed to these contaminants. Mobilplex also resists heat in the range of 300 F and offers extra protection against wear under heavy loads and corrosion. It is a singularly tenacious and adhesive lubricant.

This multi-service grease has outstanding oxidation resistance as well as excellent structural and storage stability. These qualities—plus the great versatility of Mobilplex EP—make it useful throughout the plant.

Plant operators in every section of the country are finding Mobilplex EP extremely effective in extending bearing life and protecting production schedules. In addition, they're saving more than with ordinary multi-purpose greases because Mobilplex EP makes it possible to reduce application frequency, simplify storage and handling procedures.

Contact your Mobil representative for full details. He can show you results of laboratory performance tests of Mobilplex EP and five leading competitive extreme-pressure greases. You'll see why Mobilplex EP is rated tops.

MULTI-SERVICE ABILITY OF MOBILPLEX EP

ANTI-FRICTION BEARINGS (*horizontal and vertical*). Temperatures in the range of 300 F. Heavy or shock loads. Water contamination. Speeds—low, normal, high.

PLAIN BEARINGS All normal mechanical and operating conditions. Temperatures in the range of 300 F. Waterwash. Heavy or shock loads.

DISPENSING AND APPLICATION DEVICES Transfer pumps. Hand and power guns (*long lines*). Central greasing systems.

Mobil

Proved Petroleum Products... Available with a Mobil Program of Correct Lubrication

Left: Bearings packed with Mobilplex EP are unaffected by the direct washing action of water . . . rust and wear are avoided.

Below: Bearing surfaces subjected to the washing action of soluble oil emulsions, like the slides of this multi-spindle automatic, require less maintenance with Mobilplex EP.

For more facts circle 535 on Reply Card

Westinghouse develops new motor starters with 6 "monkey proof" safety features

Westinghouse NEMA 12 Life-Line® combination starters end unauthorized tampering, offer greater safety and convenience to service personnel

To order simply contact your local Westinghouse representative or distributor now, or write Westinghouse Electric Corporation, Standard Control Division, Beaver, Pa.

YOU CAN BE SURE...IF IT'S Westinghouse

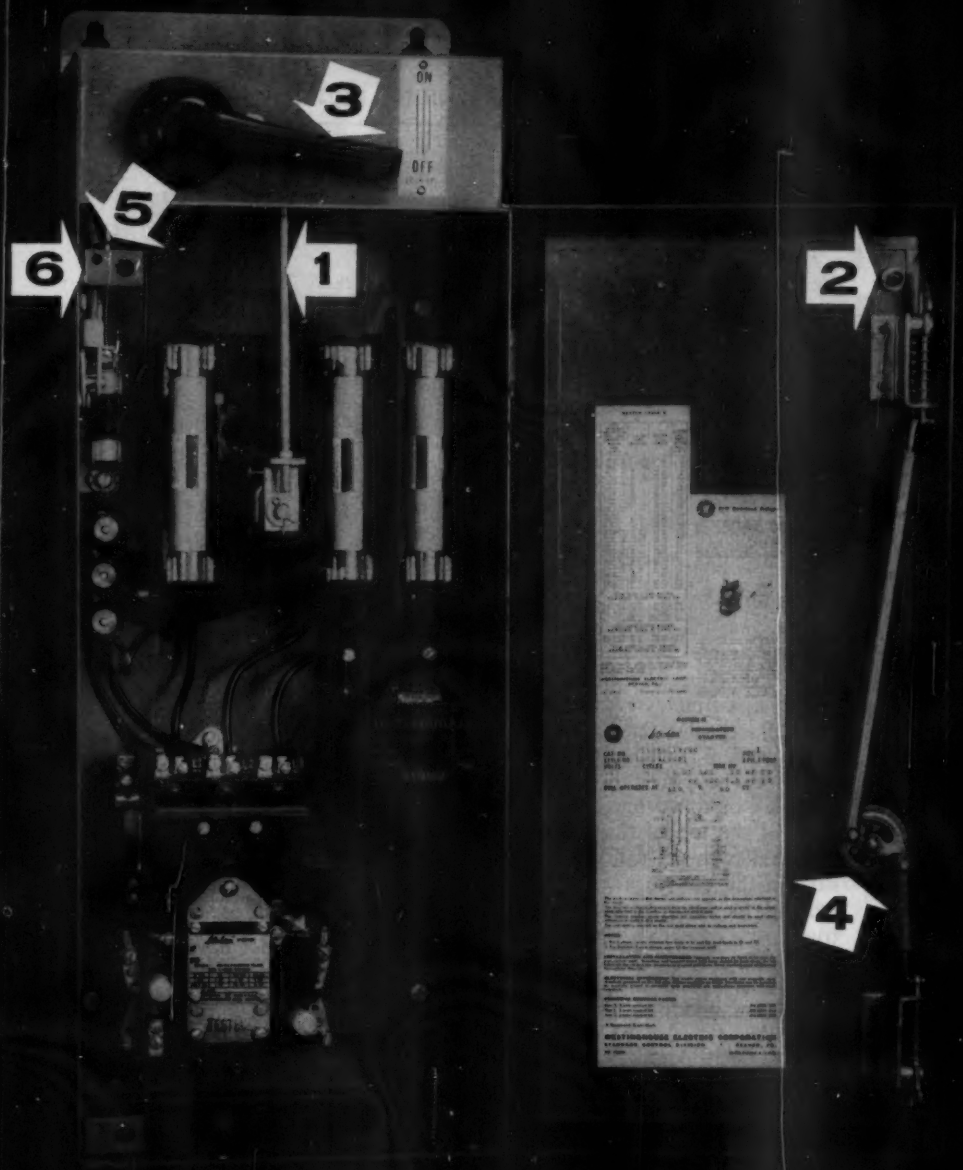
Watch "Westinghouse Lucille Ball-Desi Arnaz Shows" CBS TV Fridays

Check these 6 great new safety "firsts"... 1 2 3

SAFE—You always know whether power is on or off because ON-OFF handle is permanently attached to disconnect... even when door is open.

SAFE—Positive gasket seal keeps out oil and dust. An interlock requires that door must be tightly sealed before handle can be moved to ON position.

SAFE—Even when you're out of sight, padlocking ON-OFF handle prevents any operation of disconnect regardless of whether door is *OPEN* or *CLOSED*.



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SAFE—Discourages tampering by unauthorized personnel. Tool required to open door.

SAFE—Accidental operation of disconnect impossible when door is open. Disconnect interlock must be deliberately voided to operate ON-OFF handle.

SAFE—Interlock prevents door from being opened when switch is on. ON-OFF handle must be in OFF position to open door.

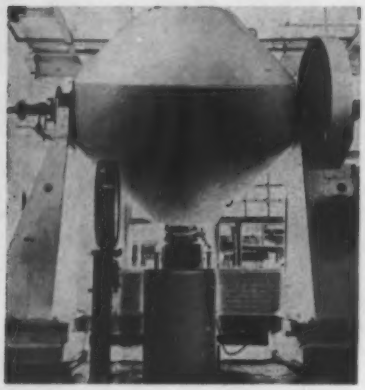
J-30306

OPERATION AND PRODUCTION —pointers for the industrial plant engineer

Edited by Vern Kempf

Dryer-Blender Saves $6400

REPLACING a conventional tray dryer and separate blending equipment with a glassed-steel conical



Dryer-blender combines drying and blending operations in one machine.

dryer-blender has saved an estimated $6400 per year for Merck & Company, Inc., Rahway, New Jersey, pharmaceutical manufacturers.

Merck is using the dryer-blender, furnished by the Pfaudler Company, to process a highly pigmented powder. Cycle time is 12 hours, compared to the 24 hours previously needed to process an equal quantity with a 120-tray dryer. Because blending and drying are accomplished simultaneously, a separate blending operation is no longer needed. The uniform blend obtained with the new machine results in easier compounding and analysis by Merck customers.

Maintenance Welding Buggy For Fast Moves Around Plant

DESIGNED AND BUILT by the maintenance department of the Timken Roller Bearing Company's Steel and Tube Division, Canton, Ohio, a portable burning buggy has reduced the time required to move welders from job to job. The buggy can be moved by crane, fork lift truck or rolled into position. A hook at the top of the frame permits cranes to get a firm hold and slots in the bottom are used when moving the unit with a fork lift truck.

A spring return reel stores the hoses and reduces the time needed to lay out and pick up hoses. In addition, only enough hose is pulled out to reach the welding location, thus reducing the possibility of damaging the hose. Gas tanks are chained to the unit and are removed only when they become empty. A fire extinguisher is a permanent part of the unit.

Designed with many safety features, welding buggy reduces moving time.

In designing the unit, it was felt that the four wheel design is safer than the usual two wheel buggy as the operator does not have to balance the unit when moving it.

The drop center provides a low center of gravity to reduce the possibility of tipping the unit over and a spring keeps the handle in an upright position to reduce tripping hazards.

Shop Modifications Increase Usefulness of Tractor Unit

Maintenance men at General Electric Company River Works Plant, Lynn, Mass., modified their new Michigan tractor to increase its versatility. They welded a rail car coupler to a special push plate to permit spotting rail cars around the plant. The workmen also added a 14-ton capacity winch at the rear of the machine.

No Fluid Product Mixing Here

FORMULA specifications at the Tretolite Company's St. Louis plant are so rigid that any contamination might render useless the contents of an entire storage tank.

Possibility of contamination was reduced by putting a test discharge line between the outlet port of each Rockwell-Nordstrom three-way valve on the manifold and the straightway valve on the line. This test line is closed and the straightway valve open on the line being used. All the other test lines on the manifold are left open.

If any wrong valve ports have inadvertently been left open, which might cause the fluid to be directed

Stack Deluxe up against ALL others

YOU'LL TAKE DELUXE STEEL SHELVING

Stack it up for strength—Deluxe offers so much more than competitive makes: I-beam construction, double thick end panels, box-lid shelves, factory embedded reinforcing bars.

Stack it up for erection time—Deluxe goes up so much faster than competitive makes. With bracket assembly, requiring only two bolting operations, you can put up a regular section in less than fifteen minutes!

Stack it up for appearance—Deluxe looks so much better than competitive makes: all component parts are finished with smooth, rounded edges; paint is electrostatically applied over Cote bonding.

Stack it up for cost—Despite all the extra quality features, the Deluxe delivered and installed price is lower than competitive makes.

Conclusion: You cannot buy better steel shelving than Deluxe!

Factory representatives and dealers in all principal cities. For further details, call your local Deluxe man or write for Catalog #284, Deluxe Metal Products Co., Warren, Pa.

FEATURE	DELUXE	Type A	Type B	Type C	Type D
I-Beam Uprights	Yes	No	No	No	No
Double Thick Sheet Steel End Panels Construction	Yes	No	No	No	No
Box-Lid Type Shelves	Yes	No	No	No	Yes
Factory Embedded Shelf Reinforcing Returned on Ends	Yes	No	No	No	No
Shelf Adjustment	2" or 1"	1"	1" 43"	1½"	1½"
Shelf Fastening	Brackets	8 Bolts Per Shelf	U Bars on Brackets	Studs & Keyhole Slots	Clips & Studs
Erection Time Per Section	Fastest—15 Min.	Slow	Medium	Medium	Fairly Fast
Smooth, Rounded Edges to All Parts	Yes	No	No	No	No
Paint Appearance	Excellent	Poor	Fair	Fair	Good

DELUXE METAL PRODUCTS COMPANY
a division of Royal METAL MANUFACTURING CO.

For more facts circle 537 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 56)

Test lines above trough alert operator.

to the wrong line, the fluid flows out of the open test line into a waste trough, alerting plant personnel.

Hole Laps Made Quickly in Shop

By B. J. Lucas, The Carborundum Company, Niagara Falls, N. Y.

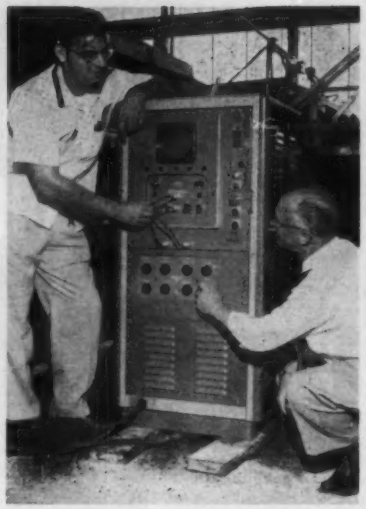
TOOL AND DIE workers often find it necessary to use laps of odd sizes when finishing holes in a die. In order to provide these special size tools quickly and cheaply, a method has been devised using ordinary copper tubing.

Tubing of the closest standard size under the hole to be honed is cut to the desired length. A shank is pressed into one end and the assembly mounted in a lathe. The tubing can now be spun out to any desired size using the shanks of drills as a mandrel. The tubing is spun to the desired diameter, less the amount that must be allowed for grit size that is to be impregnated into the surface of the tube.

Silicon carbide grits are used except for use on hard materials, in which case diamond grits are applied. The grits are spread out on a hard surface and the copper tube is rolled over them using a hard wood block to apply pressure. Sufficient pressure is applied to pick up grits and hold them on the outer surface of the copper tube.

Spots Detected—Ultrasonically

DETECTING imperfections in sheet steel with an ultrasonic method has been put into operation by Chrysler Corporation at its Nine Mile stamping plant, Detroit, Michigan. Credit for initiating the discovery of the new high-speed system for instantly revealing and rejecting faulty metal goes to Elton Allan Strohauer, a staff methods researcher.



Ultrasonic detector spots faulty sheet metal and sprays dye on imperfections.

Placed between the unwinding coil of steel and the blanking machine, the detector searches out laminations and sprays the faulty part with a bright colored dye. Laminations could be caused by dirt or other impurities in the steel. This steel is not suitable for body production and is scrapped.

Air Tool Pulls Reinforcing Core Wires From Hollow Castings in Half the Time

REMOVING reinforcing core wires from hollow castings was a time-consuming job at Forest City Foundries Co., Cleveland, Ohio, and required double handling whenever wires stuck to the castings. Various size core wires are inserted in sand cores for reinforcement and these wires must be removed after the casting is poured, cooled and run through shake-out.

Fig. 1. Reinforcing wire in mandrel slot ready to be wound up for removal.

Fig. 2. Slight taper on end of the adapter permits easy removal of wire.

Several men were employed just to remove these wires with pliers. This took longer than a minute to remove the wire from a typical casting. Whenever the reinforcing wire is close to the surface of the core, the wire tends to adhere or burn to the casting. The burned wire cannot be removed by pliers and these castings were rejected.

A ⅜-in. capacity, Ingersoll-Rand, air-powered impact tool equipped with a special adapter provided a solution to this problem. The special adapter has a 3/16-in. slot cut in the end of the anvil extension that is placed over

(Continued on page 60)

For more facts circle 538 on Reply Card ——→

***FULL VALUE* FOR YOUR TRANSFORMER DOLLAR**

8-wk shipment, 4-hr installation with G-E RM medium transformers

Shipment in eight weeks; installation in four hours. These are examples of the full value for your transformer dollar you get with General Electric RM (repetitive manufacture) medium transformers. Maintenance time also is reduced on these units.

For industrial users whose primary or secondary power load exceeds 500 kva, General Electric RM medium transformers offer many advantages. Now RM medium transformers feature interchangeable transformer-breaker bushings, lower sound levels, and improved pressure-relief devices. Other units in G.E.'s full line of transformers meet specialized industry requirements.

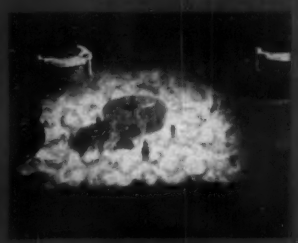
Faster order handling and shipment plus product leadership are key reasons why you get certified **full value** for your dollar with General Electric's full line of transformers for industry*. But be sure to factor in the complete G-E service provided before, during, and after installation. If you examine the **complete package,** we're confident you'll recognize the full value for your transformer dollar offered by General Electric.

For complete information and application help, see your G-E Apparatus Sales Engineer or Agent today. Or write for descriptive literature to Sect. 417–7, General Electric Company, Schenectady 5, New York.

* **Medium transformers (501 to 7500 kva), Open dry-type transformers (300 to 7500 kva), Sealed dry-type transformers (300 to 7500 kva), Distribution Equipment transformers (112½ to 500 kva), Integral Distribution Centers.**

Progress Is Our Most Important Product

GENERAL ELECTRIC



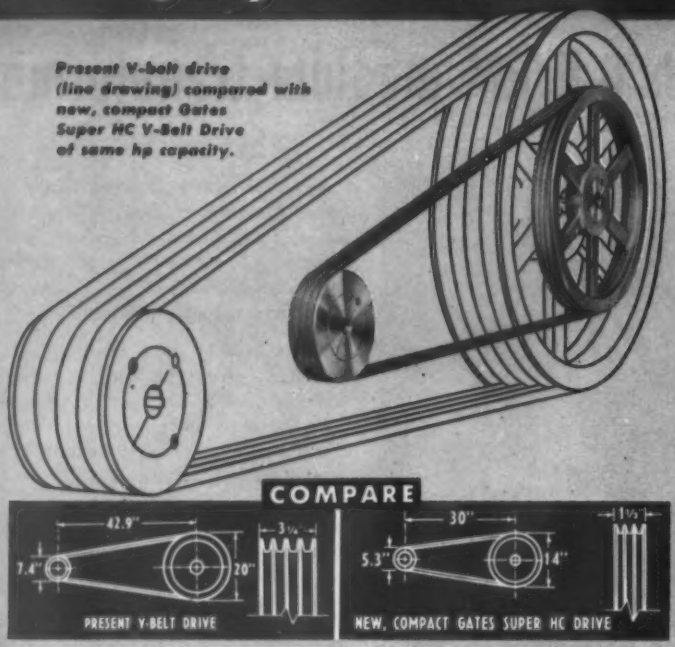
SUPERIOR DESIGN, FEATURES, PERFORMANCE of General Electric transformers is typified by new pressure relief device (left), and interchangeable transformer-breaker bushings.

TBI
GENERAL ELECTRIC

FASTER SHIPMENT through rapid processing of orders . . . computer design . . . repetitive manufacture.

COMPLETE SERVICE . . . application engineers . . . installation engineers . . . 50 nearby service shops.

Designing NEW DRIVES?



Save up to 20%

with new high capacity V-belt drive

When you change the whole drive — both V-belts and sheaves — remember: The cost of a Gates Super HC V-Belt Drive is as much as 20% less than the cost of present V-belt drives of the same horsepower capacity.

A development of Specialized Research in the world's largest V-belt laboratories at Gates, the new Super HC V-Belt makes possible the most compact, lightest-weight, lowest-cost multiple V-belt drive you can put on any machine!

Cuts drive space as much as 50%

With Gates new Super HC V-Belt, sheave diameters and widths can be reduced 30% to 50%, center distances 20% and more. Bearing load is lightened and total space occupied by the drive may be cut as much as 50%.

"The Modern Way to Design Multiple V-Belt Drives" is an informative handbook on the Super HC Drive, available from your nearby Gates Distributor listed in the Yellow Pages of your phone book.

The Gates Rubber Co., Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ont.
World's Largest Maker of V-Belts

TPA 439

Gates SUPER HC V-BELT Drives

For more facts circle 539 on Reply Card

OPERATION—PRODUCTION

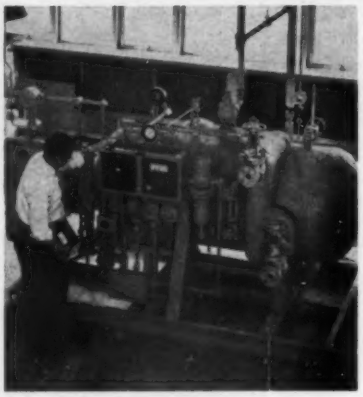
(O and P begins on page 56)

exposed end of core wire, Fig. 1.

When the tool is turned on, the wire is coiled around the adapter, Fig. 2, and pulled from the casting. Results of a time study showed wires removed in 30 seconds with the tool compared to 70 seconds previously required with pliers.

Compact Process Heater

MOUNTED on a five foot by nine foot frame, a compact electric resistance heating unit installed in the



Compact process heater produces heat at 150 psi and 750 F for pilot plant.

research laboratory of the Union Carbide Plastics Company, Bound Brook, N. J., enables research investigators to produce new chemicals and polymers by batch process for evaluation.

The unit uses a Dowtherm heat transfer medium in both liquid and vapor phases. Heat density of eight watts per square inch reduces carbonization in the boiler. Manufactured by Hynes Electric Heating Division, Turbine Equipment Company, the heater uses unitized heating elements that pull out without draining the system.

Fan Timer Reduces Complaints

PLANT PERSONNEL generally have considerable difference of opinion when it comes to operation of ventilating fans. This is not evident in the summer months when continuous operation of fans is favored.

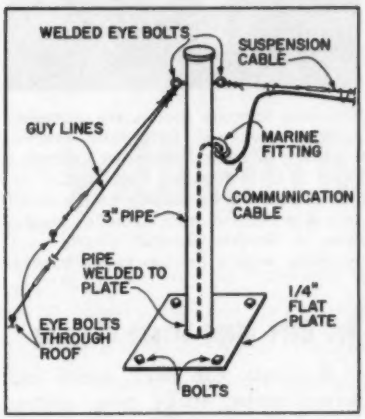
However, in spring, fall and win-

ter cold drafts and complaints follow one another as soon as the fans are turned on. In winter the air is often blue from smoking and ventilation is needed but a thirty minute exhaust period would lower the temperature below the comfort zone.

The problem was to find an economical balance between supplying the fresh air requirements of the workers and keeping the heated air of the building from being totally exhausted. Putting the fans on automatic timer control would remove the human element and a timer was selected to provide ten minutes of fan operation each hour. For summer operation the timer is bypassed with a jumper to permit continuous operation. Total cost of the installation was less than $50, which has been repaid in reduced heat loss and fewer complaints.

Pipe Mast Solves Driveway Clearance Problem

INSTALLING an interplant communication system to connect numerous one-story buildings posed a problem of how to maintain adequate clearances over driveways. As the building roofs were not high enough it was decided to install a pipe mast on each building and run a wire-rope cable at this new elevation. The communication cable was suspended from the wire rope.



Pipe mast holds cable higher than plant roof to maintain driveway clearance.

The masts were assembled by welding a three-inch pipe to a ¼-in. flat plate mounted on the roof. Two eye bolts welded to the top of the mast provide means for at-

Improved Gates Vulco Rope gives you 2 important advantages

1. 40% higher hp rating at no increase in price: This important cost-saving advance is the result of Specialized Research in the world's largest belt-testing laboratories at Gates. As replacements on standard drives these V-belts with 40% more load-carrying ability give longer service life...reduce down-time, cut belt replacement costs.

2. Concave Sides (U. S. Pat. 1813698): The sides of Gates Belts are concave (Fig. 1). When the belt is bent around the sheave, the concave sides fill out—become straight—for full, uniform contact with the sides of the sheave groove (Fig. 2). Uniform contact insures maximum pulling power...even distribution of wear...longer life.

Fig. 1

Fig. 2

Available in all sizes from your nearby Gates V-Belt Distributor listed in the Yellow Pages of your phone book.

When designing new drives use Gates new Super HC V-Belts and Sheaves. See opposite page.

The Gates Rubber Co., Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ont.

World's Largest Maker of V-Belts

Gates

TPA 432

Gates Hi-Power VULCO ROPE V-Belts

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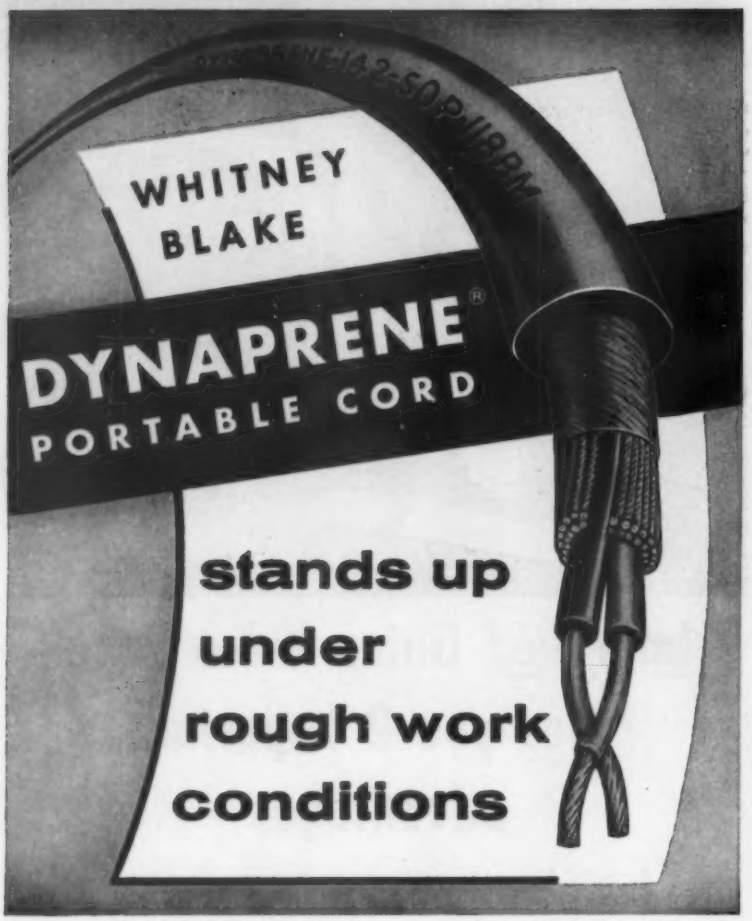


Where portable cord takes a beating because of rugged work conditions, WHITNEY BLAKE DYNAPRENE stands up and gives long, economical service.

DYNAPRENE has an especially tough neoprene jacket, it resists abrasion, has high flexibility and long flex life, and provides premium quality service at competitive prices.

Write TODAY for this complete catalog . . . FREE.

WELL BUILT WIRES SINCE 1899

WHITNEY BLAKE COMPANY

NEW HAVEN 14, CONNECTICUT

For more facts circle 541 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

taching guy and support wires and a cap is placed on top of the pipe. A fitting is used to lead the communication cable down inside the pipe to carry it into the building.

High Mounting Reduces Damage to Cooling Unit

Drinking fountain coolers are protected against damage at Caterpillar Tractor Company, Peoria, Illinois, by mounting them 12 to 15 ft above floor level. Condensation on lines leading to the fountain is prevented with Armaflex insulation, a flexible foamed plastic pipe covering with a built-in vapor barrier.

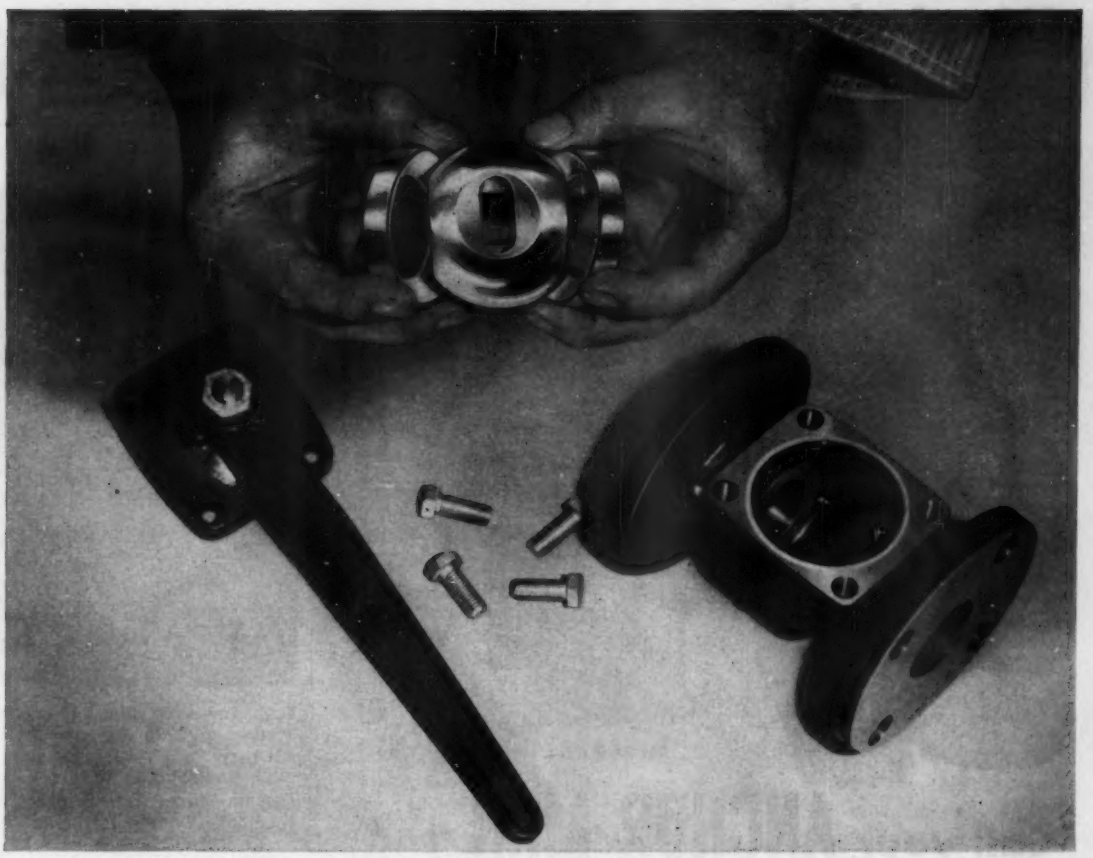
Rod Deck Stops Screen Clogging

A LOOSE ROD DECK which can screen moist, sticky ores without loss of screening efficiency has been introduced by Allis Chalmers Manufacturing Company for use on new and existing vibrating screens. The new deck, comprised of free rolling loose rods which rotate as they vibrate, greatly increases production.

Rods rotate opposite to the rotation of the vibrating mechanism at 60 to 100 rpm depending upon screen throw and speed. In handling ores, wet fines adhere to the rods to provide a thin protective coating and reduce the clear opening between the rods.

Although the loose rod deck was

New from Hills-Mc Canna Company



Now a BALL VALVE* with all the features you've wanted

Thirty years of leadership in valve manufacture now brings you the Hills-McCanna Ball Valve! It offers every advanced feature to help you cut costs, step up production, reduce maintenance, and improve product quality.

- *Drip Tight Shut-Off*
- *Self Adjusting Seats For Extended Valve Life*
- *Top Entry For Easy In-Line Maintenance*
- *Quick Opening*
- *Minimum Pressure Drop*
- *Two-Way Flow*
- *Reduced Maintenance Cost*

*PATS. APPL. FOR

Save money!...solve valving problems ...send for free booklet describing the complete line of Hills-McCanna Ball Valves. Send for your copy of booklet #1100.

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TRAFFIC CONTROL

VANDALISM

TRESPASSING

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Call your ANCHOR MAN

How well are you protected from the financial drain of vandalism, from petty pilferage, from costly lawsuits due to injuries?

Your Anchor Man can show you the many ways Anchor Fence is engineered for protection—for instance, how Anchor's exclusive square terminal posts give you added security by removing potential toe and hand holds.

His visit could save you thousands this year.

Call your local Anchor Fence office today. Ask for the Anchor Man who specializes in your type of installation. For informative literature write: ANCHOR FENCE, 6661 Eastern Ave., Baltimore 24, Maryland.

ANCHOR FENCE

Division of ANCHOR POST PRODUCTS, INC.®

Plants in: Baltimore, Md.; Houston, Tex.; and Whittier, Cal. Sold direct from factory branches and warehouses in principal cities.

For more facts circle 543 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

Rods rotate in direction opposite vibration to keep the openings clear.

developed specifically to overcome clogging in sizing iron ore, the new design should also prove effective wherever there is a need for screening other types of moist, sticky materials.

Unit Supplies Light and Air

Combining low velocity air diffusers and light fixtures in one unit has improved the appearance of the ceiling in the Graybar Electric Company offices, Melrose Park, Illinois. Developed by the Pyle-National Company, Chicago, the units diffuse the air through the tiny side slots in the lighting fixtures.

MICRO SWITCH Precision Switches

Listed by Underwriters' Laboratories
as rain-tight and suitable for use in hazardous atmospheres: Class I, Groups C and D; Class II, Groups E, F and G. Electrical rating: 20 amps, 125, 250 or 460 vac; 1 hp, 115 vac; 2 hp, 230 vac.

Here's the switch for your toughest exposed locations

Big, ruggedly built, armored against the effects of hot sun, heavy rain, dry blowing dust, or explosive atmosphere, this Series "CX" switch gives precise circuit control for long-life maintenance-free operation.

Seals keep out dirt, dust and moisture. Housings are cast aluminum. Lever arm is adjustable thru 360 degrees and length can be varied from 1 inch to 3½ inches. In the housing are two single-pole double-throw snap-action switching units. One switch is operated by clockwise rotation of the lever arm—the other switch by counter-clockwise rotation. Operating force—4 lbs. maximum.

If you need a switch that can "take it"—this is it.

Your nearest MICRO SWITCH branch office will be glad to give you complete information. Look in the Yellow Pages. Send for Data Sheet 156.

MICRO SWITCH . . . FREEPORT, ILLINOIS
A division of Honeywell
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Honeywell
MICRO SWITCH Precision Switches

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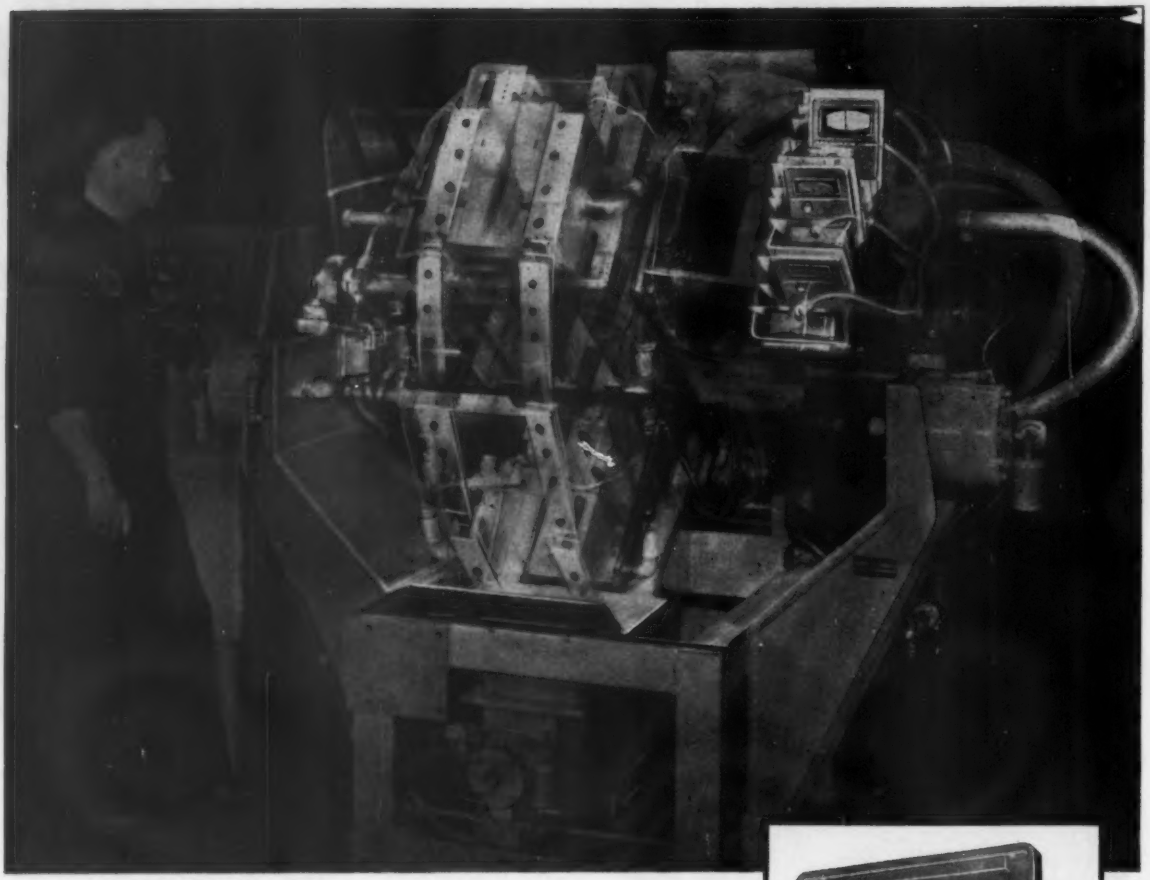

A Partlow Model MFS indicating controller is shown in action in this "multiple exposure" shot of a Hole-Core Automatic Molding Machine manufactured by Spo, Inc., Cleveland, Ohio.

The Temperature Control Built to
SHRUG OFF SHOCK
2438 Times a Day

Every working day, the Partlow Temperature Control in this photo takes between 2400 and 2500 solid "roundhouse punches" from the shell-molding machine to which it is attached.

But despite jarring shock and vibration, and a constant barrage of foundry dust, the Partlow goes right on delivering precision control—without letup or breakdown.

Actually, only a control as simple and rock-solid as the Partlow could withstand this kind of punishment! Because only the Partlow contains no hairsprings, or delicate gadgets.

All Partlow thermal elements of the same range are interchangeable *on the job*, too. There's no time lost waiting for your control to come back from the factory. And you get this extra margin of dependability *without loss of accuracy*. Partlow controls are precise to within 1% of scale in any one of 10 ranges from −30° to 1100° F.

If you use or manufacture equipment within this temperature range, there's a Partlow to fit your application exactly . . . and save you money, too. Available in Pneumatic, Electric or Self-Contained Gas types, in recording, indicating or non-indicating models! To field test any Partlow control . . . or to obtain full details write, The Partlow Corporation, New Hartford, N. Y. Dept. PE-119

Export: Ad. Auriema, Inc., 85 Broad St., New York 4, N. Y.

A complete absence of gadgets and superfluous parts, as seen in this open view of the new MFS indicating control, explains the Partlow's unique ability to function accurately even under the most severe operating conditions.

You can pay more but you can't buy better than

PARTLOW

TEMPERATURE CONTROLS

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Hats off to the profit makers!

Maintenance departments are major profit makers. Here's why:

A 10% reduction in maintenance costs can result in a *4% jump in profits in the average plant*—according to latest Commerce Department figures.

Increasing numbers of cost-conscious maintenance men are adopting Organized Lubrication as one of the proven ways to reduce costs. As Texaco Lubrication Engineers have demonstrated time and again, an Organized Lubrication program can *cut direct maintenance costs as much as 10%!* (Other benefits: more dependable production, reduced lube inventory, simplified purchasing.)

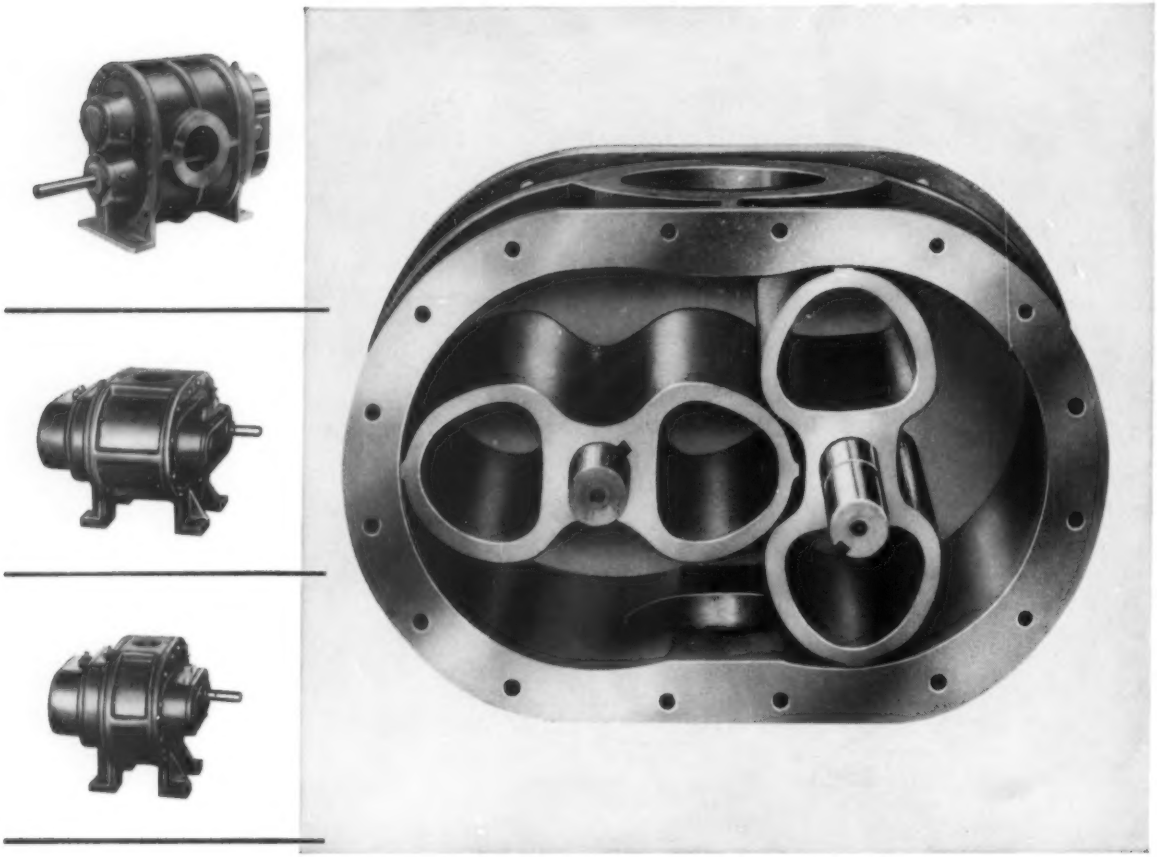
Managers throughout the U.S. who have installed and evaluated Organized Lubrication programs can testify to the profit gained.

Texaco Lubrication Engineers can offer help and helpful material to start an Organized Lubrication program in your plant. Why don't you look into it? Call our expert—or write for a copy of our book: "Organized Lubrication . . . Major Cost Control Factor."

☆ ☆ ☆

Texaco Inc., 135 East 42nd Street, New York 17, N. Y., Dept. E-130.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL



Sutorbilt blowers deliver air or gas at capacities up to 20,000 cubic feet per minute and pressures or vacuums up to 10 pounds. Design incorporates two figure-eight impellers which rotate in opposite direction and deliver a metered volume of air or gas.

SUTORBILT BLOWERS ASSURE TOP PERFORMANCE AND DEPENDABILITY

You want peak performance . . . from a blower that needs no special attention. Sutorbilt *ruggedness* gives it to you! Cases, headplates and impellers are of sound, close-grained cast iron. Heavy-duty anti-friction bearings maintain factory clearances throughout long service life. Wide-face herringbone gears, —run in a bath of oil—are engineered to absorb heavy shocks without affecting precise timing of impellers.

These and other Sutorbilt design features —plus highest-quality manufacturing methods—assure maximum, maintenance-free service from Sutorbilt blowers and gas pumps. Write for illustrated brochure giving complete specifications.

Representatives located in principal cities. Consult your classified telephone directory.

SUTORBILT IS WELL BUILT

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Subsidiary of Fuller Company, Catasauqua, Pa.

FULLER COMPANY GENERAL INDUSTRIES TRADE MARK

ROTARY POSITIVE-PRESSURE BLOWERS AND GAS PUMPS WITH VERTICAL OR HORIZONTAL MOUNTING

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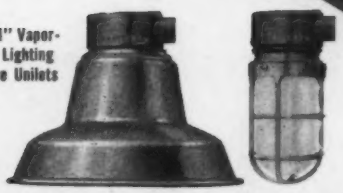
"AE" Plug and Receptacle Series Unilets

"AE" Series 30, 60, and 100 ampere plugs and receptacles come equipped with solderless connectors and replaceable interiors. Choice of lift cover, or threaded cap types.

"V-51" Vapor-Tight Lighting Fixture Unilets

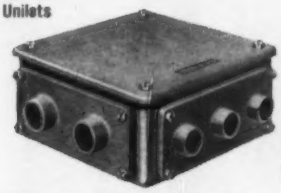


Vapor-tight lighting fixture series for use with rigid conduit. Known for its patented unit construction. Reflector and guard can be put on and taken off quickly . . . without tools! Designed for easy installation plus simple maintenance.

APPLETON®

Malleable Iron UNILETS®

"RS" Series Malleable Unilets



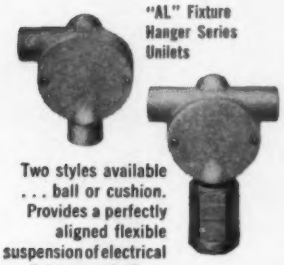
A universal junction Unilet box permitting flexibility of hub arrangements for easy adaptation in the field. Water-tight!

One of the most complete selections in the industry!

Yes, APPLETON can supply you . . . with a wide variety of Unilets for receptacles, switches, plain junctions, pilot lights, fixture hangers, etc. Ample wiring room. Assorted hub arrangements. *You name it, we've got it* . . . for indoors or out.

And every APPLETON product is made to the rigid quality standards pioneered by APPLETON engineers. They are easy to wire, are blemish free, have clean, chamfered threads conforming to N.P.T. requirements assuring a tight joint and positive ground. Next time you buy, specify APPLETON!

"AL" Fixture Hanger Series Unilets



Two styles available . . . ball or cushion. Provides a perfectly aligned flexible suspension of electrical fixtures and allows a swivel to 20° in any direction.

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Weather-proof housings for junctions, receptacles and switches . . . for use outdoors or in. One, two, three and four-gang styles.

Form 35 Series Unilets

Threaded and no-threaded malleable iron series . . . taper threads . . . covers held by screws — will not vibrate loose . . . high quality finish . . . full line.

"JB" Series Vapor-Tight Unilets

With or without mounting lugs. 4 tapped holes and 2 close-up plugs or blank body without close-up plugs. ½", ¾" and 1" sizes for use as "E", "C", "T", or "X" bodies.

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Also Manufacturers of:

Explosion-Proof Lighting Fixtures

"Eagle Claw" Outlet Boxes

"ST" Series Connectors

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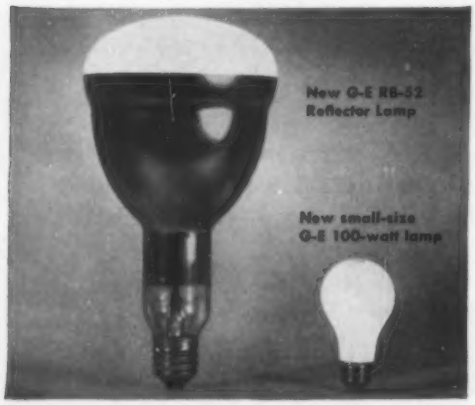
In fluorescent...filament...and mercury...

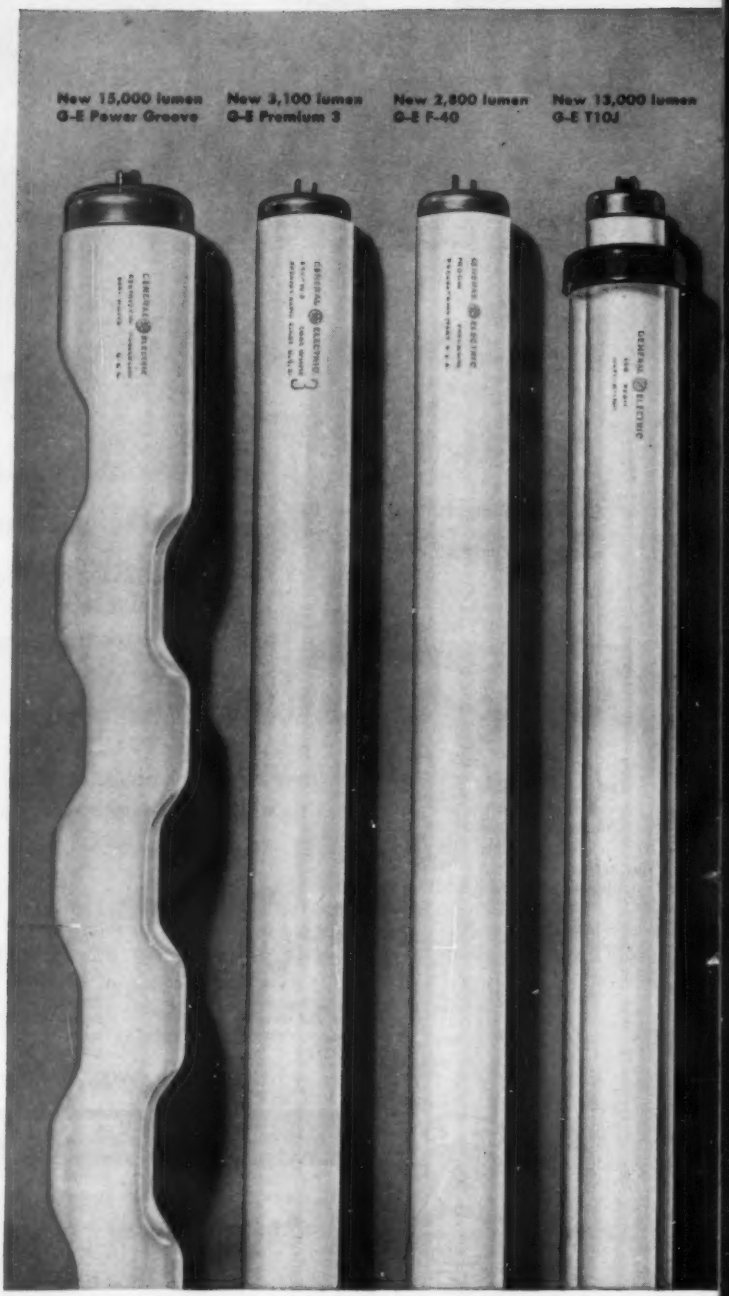
Your best bargains in light are General Electric Lamps

Here are the most dramatic new lamps this year—and every one came first from General Electric!

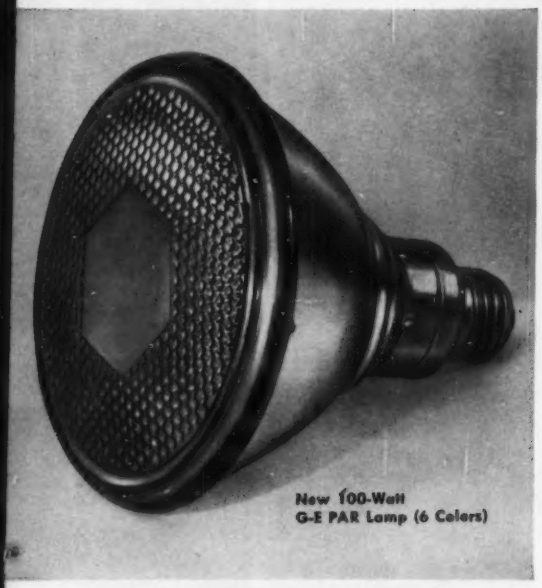
4 NEW G-E FLUORESCENT TYPES
(1) Multiple Power Groove, most powerful fluorescent you can buy, saves up to 40¢ a square foot initial investment over other fluorescents. (2) The F-40, for universal use, *costs 5¢ less* . . . and *delivers 6% more light* than previous 40-watt G-E Rapid Start Lamps. Operates in starter-type circuits, too. (3) PREMIUM 3, first 40-watter ever to exceed 3,000 lumens (3,250 in white), also operates in either type of circuit. (4) The T10 is the first fluorescent lamp ever designed for outdoor use. Rated at 13,000 lumens and designed for *enclosed single lamp fixtures* it stays brighter even in cold, windy weather. The T10J (shown at right) is a T10 lamp fitted with a glass jacket and is made for *exposed lamp installations.*



2 NEW G-E BONUS LINE FILAMENT LAMPS—(1) *New smaller 100-watt bulb* . . . small as a 60 watt, but delivers more initial light than two 60's. More light than any previous 100-watt bulb. How? With the General Electric "stand-up" filament that delivers more light. (2) *New G-E RB-52 Reflector Lamp* has special "bulge" shape to distribute heat, permits economy of regular glass construction; silver reflector instead of aluminum; the first thousand-watt reflector lamp with the "stand-up" filament . . . puts 20-30% more light on work area.

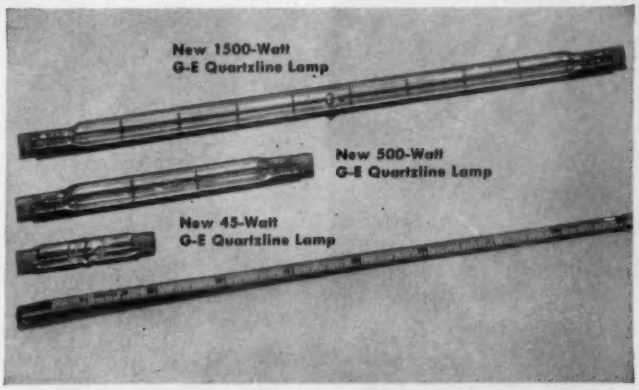


FIRST COMPLETE LINE OF 400-WATT BONUS LINE MERCURY LAMPS—Bonus Line Mercury Lamps give you more light for the electricity, and like other General Electric Mercury Lamps, at any given time in their life, will outperform any other brand the same age. What's more, they're built to last as long or longer than any other. Bonus construction eliminates arc tube blackening. Choose from six G-E Bonus Line 400-watt Mercury Lamps.



NOW—MORE ECONOMICAL FLOOD-LIGHTING IN COLOR—Dramatic new 100-watt G-E color PAR Lamps for display or decoration, available in red, yellow, blue, green, pink and blue-white. Newly developed silicon coating lets more light through—positively won't crack in rain or snow.

FREE FROM G.E.—Right now . . . today you can get a startling new 20-page picture paper packed with factual information on lamps and lighting that can save you big money. Write for your free copy today. Just send your name, company, address, to General Electric Co., Large Lamp Dept. C-933, Nela Park, Cleveland 12, Ohio. Be sure to ask for "FACTS OF LIGHT".



3 NEW G-E QUARTZLINE LAMPS—Smallest, brightest, most efficient incandescent lamp ever offered commercially. Packs tremendous amount of light into tiny unit (1/200th the size of other lamps of equal wattage). Pencil-thin, now available in 45-, 500- and 1,500-watt sizes. No lamp blackening, no dust accumulation. Rugged quartz tube won't crack even if splashed with ice water.

WHICHEVER LAMP YOU CHOOSE, know how your lighting costs break down. For example, on 40-watt fluorescents, your costs average only 10% for lamps, so even a 50% lower price would cut your costs by just 5%. Electricity uses 70%. The other 20% is maintenance (here G-E Lamps really save money!). Across the board they're more uniform in light output, predictable life, color and freedom from defects. They're right at the start . . . and have fewer early burnouts, so maintenance costs drop. This same uniformity makes all G-E Lamps your BEST BARGAIN in light.

Progress Is Our Most Important Product

GENERAL ELECTRIC

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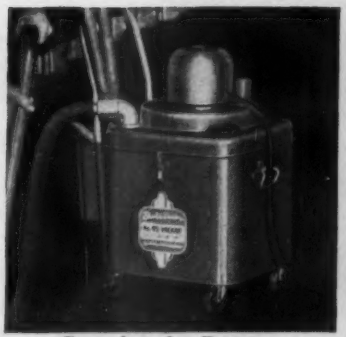
A beauty of a buy!
B D
Black & Decker
25
New High Styled Heavy-Duty
BLACK & DECKER VACUUM CLEANERS

Black & Decker Heavy Duty Vacuum Cleaners designed to suit your every need

Take the new No. 25 Heavy-Duty, for example. Here's *whisper-quiet* cleaning in a new concept of industrial vacuuming. The 25's swivel top permits cleaning a 15′ circle without moving the vacuum. And when the job's done just throw away the disposable bag! With power to spare the No. 25 is the most compact heavy-duty vacuum on the market.

Other models, ideal for general office, factory and furnace room use, are the No. 35 (⅛ bushel capacity); No. 65 for wet and dry cleaning; No. 95 for extra capacity and power. No. 55 for super capacity (50 gallons); and No. 648, designed for efficient furnace cleaning.

Whatever your cleaning needs call on B&D power, capacity, quietness. See the line soon. Mail coupon for free demonstration.



Capacity plus Power
. . . No. 95

Super-Capacity Cleaning
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QUALITY ELECTRIC TOOLS

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☐ Please arrange a demonstration of _____
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Name _____ Title _____

Company _____

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☐ Drills ☐ Saws ☐ Scrugun® ☐ Belt Sanders

THIS IS CORONA EFFECT

SPECTACULAR—
BUT IT'S ONE OF HIGH-VOLTAGE CABLE'S WORST ENEMIES

Corona means crown. It can also mean trouble for ordinary high-voltage cable—because corona is also the name for a low-energy electrical discharge (the glow around the crown at left) which actually cracks and splits ordinary rubber insulation. How? By ionizing any air in between and around conductor and insulation, it creates ozone, ultraviolet light, and certain nitrogen compounds.

And ozone, for example, works itself into ordinary rubber insulation and splits the long-chain rubber molecules. In time you see the costly result—cracked insulation and cable failure.

HERE'S ANACONDA'S ANSWER

Butyl—the most effective rubber insulating material ever developed—has inherent resistance to ozone. And—to aging, moisture, and heat.

But—butyl handles differently from other rubbers. Additives, usually in the form of finely divided powders, are extremely difficult to disperse uniformly in the raw butyl. Butyl also presents special vulcanizing problems. In short, proper manufacture of butyl insulation requires specialists and specialized equipment at every manufacturing step.

That's why Anaconda built a new plant for just one product—Anaconda Butyl (AB) Cable. The men behind this specialized equipment have but one job too—to study and improve the design and manufacture of butyl-insulated high-voltage cable.

This specialized manufacture and specialized inspection, test and quality control are part of the reason why Anaconda Butyl (AB) Cable means long-range economy and reliability, and why you should specify (AB) to protect your investment in high-voltage cable.

Send for publication DM 5903: High-Voltage Durasheath* Cable to Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.

*Reg. U.S. Pat. Off. 89237

ASK THE MAN FROM

ANACONDA®

ABOUT BUTYL (AB) HIGH-VOLTAGE CABLE

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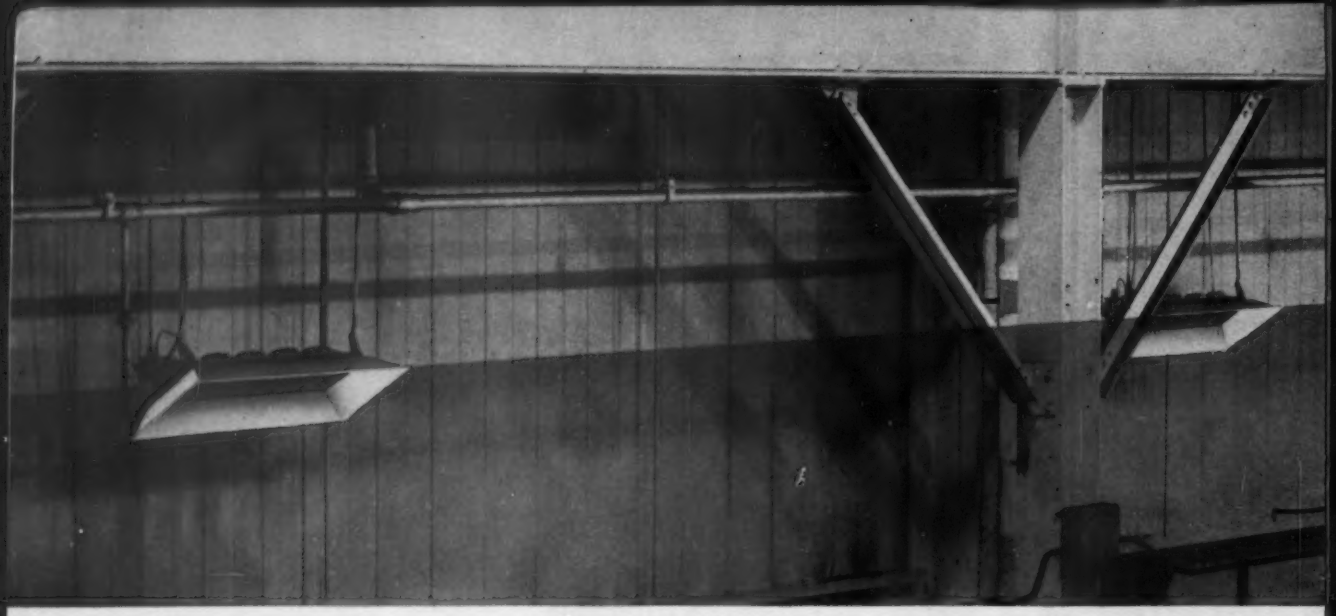

with *Perfection Schwank* INFRA-RED Gas Heaters

"We never give heating equipment . . .

. . . "and why should we," says L. W. Morgan, Plant Engineer at The Yoder Company's new metal-forming machinery plant in Cleveland, Ohio. "We have no blowers, ducts or heat exchangers to worry about. What's more, our employees have never before enjoyed such perfect working comfort . . . even when outside temperatures drop below zero."

"There are no disturbing drafts and we've eliminated the 4 or 5 hour warm-up period required by other systems to bring plant temperatures up to comfort level. Also, machinery and tools are always warm to the touch. We plan to use these same heaters in our next plant expansion."

Comments such as this sum up the feelings of over 15,000 enthusiastic users of Perfection Schwank Infra-Red Gas Heaters. *Call, Write or Wire for complete information and literature.*

MATCH THESE FACTS WITH *ANY* OTHER HEATING SYSTEM!

Building Size: 100′ x 380′ x 40′, plus 30′ x 60′ x 18′ truck dock, plus 40′ x 40′ x 18′ compressor room. A total of 1,581,000 cu. ft.

Construction: Walls: Stainless steel sandwich 1½″ insulation. Roof: 4″ pre-cast concrete, ¾″ rigid insulation.

Heater Mounting Heights: 99 units installed at 16′—18′—40′.

Temperature: 68° constant

Degree Days (63° Base): 5455

Estimated Heat Loss (computed on ASHRAE basis): 3,740,000 BTU per hour

Installed BTU*: 4,488,000

Period of Study: September 16, 1958 to May 10, 1959

Fuel Consumption (Infra-Red): 5,477 Mcu.ft. of natural gas (1000 BTU/cu.ft.) for a total of $3,722 for the period studied.

Electrical Cost: (estimated for Infra-Red): $15.00

Probable Fuel Consumption (ASHRAE—efficiency of 80%): 8,440 Mcu.ft. of natural gas (1000 BTU/cu.ft.)

**Input equivalent to that required with an 80% efficient heating system. Note actual efficiencies.*

Perfection industries 1135 Ivanhoe Rd., Cleveland 10, Ohio

division of Hupp Corporation / licensee of American Infra-Red Radiant Co.

Under Schwank U.S. Patents 2,775,294 and 2,870,830 and pending applications

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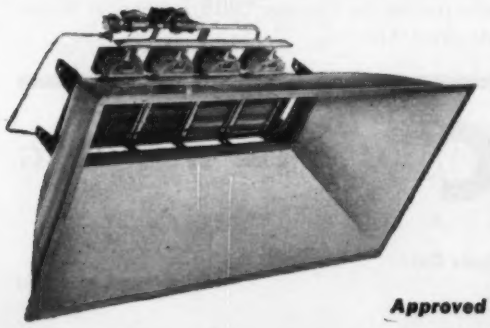
maintenance a second thought"

Partial view of The Yoder Company's new plant, designed by McGeorge-Hargett & Associates, Cleveland, Ohio.



WARM THE MAN AND THE JOB ...*NOT* THE AIR

The rays of heat energy from these generators, like the rays of the sun, heat only the objects they touch and are not wasted on the air around the objects. Once the energy waves strike a person in their path, or the floor, wall or machinery, they are transformed into heat. The result is uniform heating comfort no matter how fast temperatures change.

Approved by American Gas Association, Underwriters, C.G.A and C.S.A.

POINT BY POINT FOAMGLAS® INSULATION PROVED BEST

New 1¾" FOAMGLAS cleared the air for United Board & Carton Co.

Interior heat resulting from the constant operation of heavy board mills . . . *plus* extreme New York State winter temperatures . . . *plus* heavy ice and snow covered roofs . . . *equalled* an annoying "fog" and dripping water problem for the United Board & Carton Company, Lockport, New York.

The answer was new 1¾" FOAMGLAS roof insulation.

United Board & Carton reports that the installation of 28,400 feet of 1¾" FOAMGLAS insulation has eliminated a severe wintertime condensation or "fogging" problem on the main machinery floor of the 3-story board mill. Condensation was unhealthy for workers, and a dangerous safety hazard as well. Lift truck and crane operators sometimes could not see 10 to 15 feet in front of them.

FOAMGLAS insulation cleared the air because its cellular glass composition is completely impervious to water and moisture. It is its own natural vapor barrier to assure constant insulating value—and cut expensive heat loss. FOAMGLAS is strong enough to support any roof load—even heavy New York snows weighing up to 35 lbs. per sq. ft. These many benefits led United Board to specify FOAMGLAS for still another mill re-roofing job.

Put these extra benefits to work in your next new roof or re-roofing specification. Available in 1¾", 2", 3", and 4" thicknesses. Send today for a copy of our new Building Insulation Catalog. Pittsburgh Corning Corporation, Department PE-119, One Gateway Center, Pittsburgh 22, Pennsylvania. In Canada: 3333 Cavendish Boulevard, Montreal, Quebec.

PITTSBURGH pc CORNING

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Prepared by B. A. Wasil, Structural Engineer

DESIGN OF CONCRETE FOOTINGS
PART III

IN THE LAST BRIEF, Case 1 of non-axially loaded footings was discussed . . . dealing with the footing design when the moment acts in one direction only. Case 2, where the moment may act clockwise or counterclockwise, but does not exceed a given value, will be discussed here.

This footing represents a class of foundations different from those previously discussed. In all cases before, the soil pressure was maintained as a uniform pressure. Although a uniform soil pressure is the most efficient and structurally most desirable, it is impossible to maintain, in this type of footings. Where the moment is fixed in direction, the column may be placed eccentrically to create a uniform soil pressure; where the moment may vary plus or minus, maintaining uniform soil pressure is impossible.

In such cases, the criteria for design of the footing are these:

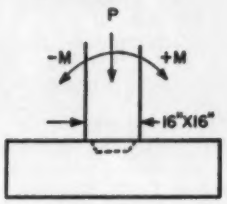
1. The extreme soil pressure not to exceed the allowable value.
2. There be no area under the footing in tension.

The example that follows illustrates this case.

Design of a Square Column Footing (subject to an axial load and a moment which may act clockwise or counterclockwise)

Governing Data

P = 245 kips
M = ± 204 ft-kips
Bearing value f_b = 3 kips/sq ft



Allowable Stresses

f_s = 20,000 psi
f'_c = 3,000 psi
f_c = 1,350 psi
v_c = 75 psi
u = 240 psi

Design Constants . .

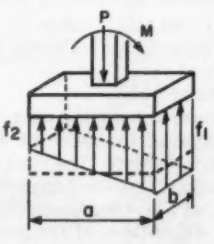
k = 0.403
j = 0.866
R = 236
n = 10

Design

1. Size of footing

Assume total depth is 24 in. and once again the net bearing pressure = 2700 lb/sq ft. Since the moment can go either way, the footing is placed symmetrically under the column. The soil pressure is assumed to vary as a straight line function.

If we consider the effects of the soil pressure from the axial load and moment separately, then:



$$f_1 = \frac{P}{ab} + \frac{6M}{a^2b}$$

$$f_2 = \frac{P}{ab} - \frac{6M}{a^2b}$$

From the criteria established, then we can say

$$f_1 = \frac{1}{ab}\left[P + \frac{6M}{a}\right] < f_b$$

$$\text{and } f_2 = \frac{1}{ab}\left[P - \frac{6M}{a}\right] > 0$$

For our problem, then,

$$f_1 = \frac{1}{s^2}\left[245{,}000 + \frac{6 \times 204{,}000}{s}\right] < 2700$$

$$f_2 = \frac{1}{s^2}\left[245{,}000 - \frac{6 \times 204{,}000}{s}\right] > 0$$

Setting the second equation equal to zero and solving,

$$s = 5 \text{ ft}$$

Therefore, any value greater than 5 ft will satisfy criteria 2.

Setting the second equation into an equality and solving the 3rd degree equation, we find:

$$s^3 - 91s - 453 = 0$$

Try s = 11 ft;
then $s^3 - 91s - 453 = 1331 - 1001 - 453 = -123$

Using Newton's method, the 1st derivative;

$$3s^2 - 91 = 363 - 91 = 272$$

$$\Delta s = -\frac{-123}{272} = +0.452$$

Therefore, s = 11.452 ft (2nd approx.)

Use s = 11 ft, 6 in.

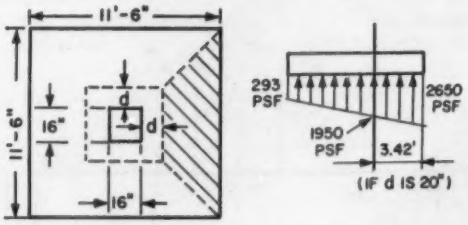
$$f_1 = \frac{1}{(11.5)^2}\left[245{,}000 + \frac{6 \times 204{,}000}{11.5}\right] = 2650 \text{ lb/sq ft}$$

$$f_2 = \frac{1}{(11.5)^2}\left[245{,}000 - \frac{6 \times 204{,}000}{11.5}\right] = 293 \text{ lb/sq ft}$$

2. Shear and depth for shear

Assume d = 20 in. and determine v at most critical face.

V is equal to the total stress in the crosshatched area. This value can be approximated by Stimson's rule.



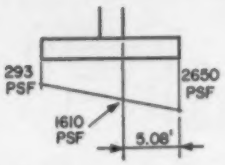
$$V = \left[\frac{1950 \times 4.67 + 2650 \times 11.5}{2}\right] 3.42 = 67{,}700 \text{ lb}$$

$$v = \frac{67{,}700}{56 \times .866 \times 20} = 69.9 \text{ psi} < 75 \text{ psi (OK)}$$

3. Moment and check of depth for moment.

$$M = \frac{5.08^2}{2} \times 11.5 \times 1610 + \frac{5.08^2}{3} \times 11.5 \times 1040 = 342{,}000 \text{ ft-lb}$$

$$bd^2 = \frac{M}{R}$$



$$(12 \times 11.5)\,d^2 = \frac{342{,}000}{236} \times 12$$

$$d = 11.9 \text{ in.} < 20 \text{ in. (OK)}$$

4. Steel Requirements

There will be two computations for steel:

a. Steel running in direction of moment;

b. Steel running normal to moment.

a. Steel in direction of moment

$$A_s = \frac{M}{f_s jd} = \frac{342{,}000 \times 12 \times .85}{20{,}000 \times .866 \times 20} = 10.05 \text{ sq in.}$$

b. Steel in direction normal to moment.

In computing the moment, the average value of soil pressure, or 1470 lb/sq ft, is used.

$$M = \frac{5.08^2}{2} \times 11.5 \times 1470 = 218{,}000 \text{ ft-lb}$$

$$A_s = \frac{218{,}000 \times 12 \times .85}{20{,}000 \times .866 \times 20} = 6.42 \text{ sq in.}$$

5. Bond Requirements

a. Steel in direction of moment

$$V = \frac{(1610 + 2650)}{2}\ 11.5 \times 5.08 = 124{,}500 \text{ lb}$$

$$\Sigma_o = \frac{124{,}500 \times .85}{240 \times .866 \times 20} = 25.6 \text{ in.}$$

Use eight No. 10 bars; $A_s = 10.16$ sq in.
$\Sigma_o = 31.9$ in.

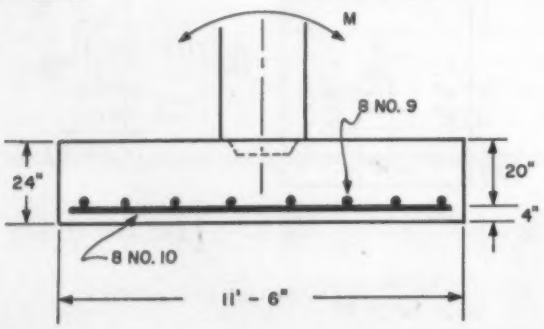
b. Steel in direction normal to moment

$$V = 1470 \times 11.5 \times 5.08 = 85{,}800 \text{ lb}$$

$$\Sigma_o = \frac{85{,}800 \times .85}{240 \times .866 \times 20} = 17.5 \text{ in.}$$

Use eight No. 9 bars; $A_s = 8.00$ sq in.
$\Sigma_o = 28.4$ in.

6. Sketch



MACHINERY PADS

Machinery pads are ordinarily of two types:

a. Tied pad, made integral with the structural framework;

b. Independent pad, kept free of the structural framework, and set on its own foundation.

There are many conditions that could influence the choice between the two types of pads. Basically, these conditions can be divided into:

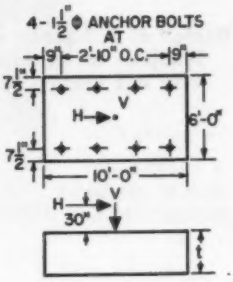
1. Weight, vibration and impact characteristics of machine
2. Type and nature of structural framework
3. Type and nature of foundation

Simply, this rule applies: should the foundation conditions present no complex problem, a light machine (and even a heavier machine where vibration and impact characteristics are small) may be placed on a tied pad; heavy machines presenting a vibration and/or impact problem should be on an independent pad.

The design of the pads, in most cases, depends upon providing sufficient mass to cushion vibrating effects. The usual rule of thumb is to provide a pad where weight is more than twice that of the machine. The load from the machine is ordinarily spread onto the pad to provide negligible stresses in the pad; thus reinforcing is nominal.

In sizing an independent pad, the designer should follow the procedures developed for footings, paying particular attention to impact effects.

Design of an Independent Machinery Pad

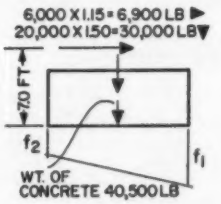


Governing Data

The pad shown is the manufacturer's requirement. For this hypothetical problem, the manufacturer states that:

V = 20,000 lb
H = 6,000 lb

Vertical impact, use 50 per cent; horizontal impact, use 15 per cent. Concrete to be used is $f'_c = 3000$ psi and allowable soil bearing is $f_b =$ 3 kips per sq ft.



Design

1. Size of pad

Criteria: Weight of pad to be twice that of machine, therefore use concrete weighing 150 lb per cu ft

$$t = \frac{20{,}000 \times 2}{6 \times 10 \times 150} = 4.44 \text{ ft. Say 4 ft, 6 in.}$$

2. Check maximum soil bearing

$$f_1 = \frac{70{,}500}{10 \times 6} + \frac{6900 \times 7 \times 5 \times 12}{6 \times 10^3}$$

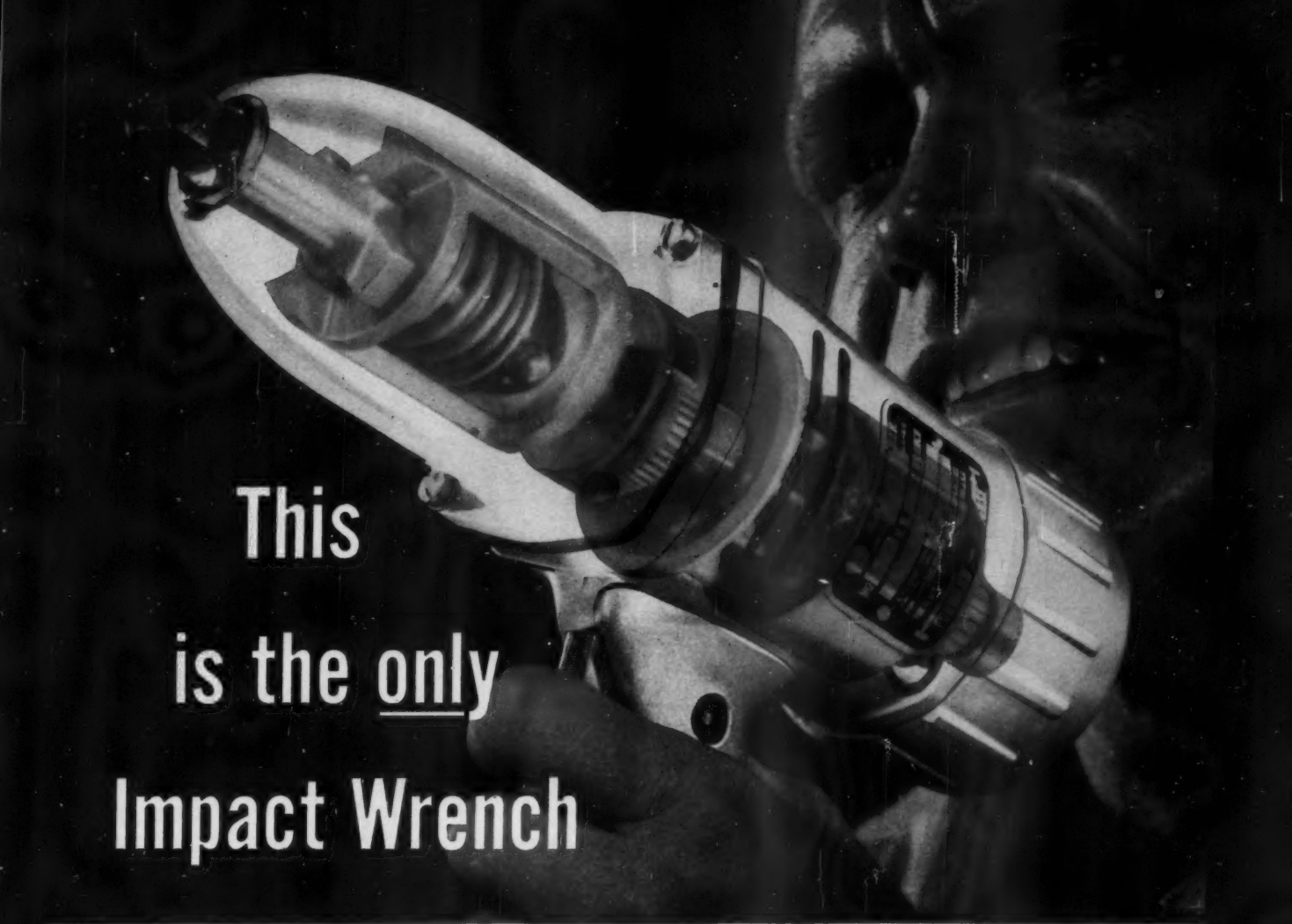
$f_1 = 1175 + 483 = 1658$ lb/sq ft < 3000 lb/sq ft (OK)

$$f_2 = \frac{70{,}500}{10 \times 6} - \frac{6900 \times 7 \times 5 \times 12}{6 \times 10^3} = 692 \text{ lb/sq ft} >$$ (OK)

3. Reinforcing.

Since the stresses due to bending are obviously small because of the depth of the concrete, nominal steel is all that is required. The steel is to prevent large cracks due to shrinkage and/or temperature changes.

Use No. 4 bars, on 12-in. centers both ways, on each of the six surfaces of the pad.



This is the only Impact Wrench

that has the GUTS to give you a free year's service certificate!

No other impact wrench on the market gives you so much durability even in tough service. The story's on the inside of a B&D Heavy-Duty Impact Wrench:

- Specially selected Drive Spindle Bearing—to eliminate bearing breakdown.
- "Life-tested" Impact Mechanism Spring repeatedly compressed over 100 million times.
- Anvil and Impactor precision machined from specially treated alloy steel to stand repeated crushing blows.
- Minimum friction cam mechanism gives extra power without extra weight.
- Famous B&D motor specially designed for Impact Wrench power.
- Fully reversible with easy to use reversing ring.

Wherever a bolt, nut, wood or lag screw must be spun, or drilling or tapping done—in machinery moving, installation work, general maintenance or production, a B&D Impact Wrench will do the job faster, with less fatigue, and at lower cost. And ONLY Black & Decker backs performance with a free year's service certificate!

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MOVING huge tank with an American 300 Series Truck Crane.

Only American Gives You This Exclusive Line

ON CRAWLERS—ON RUBBER—ON RAIL

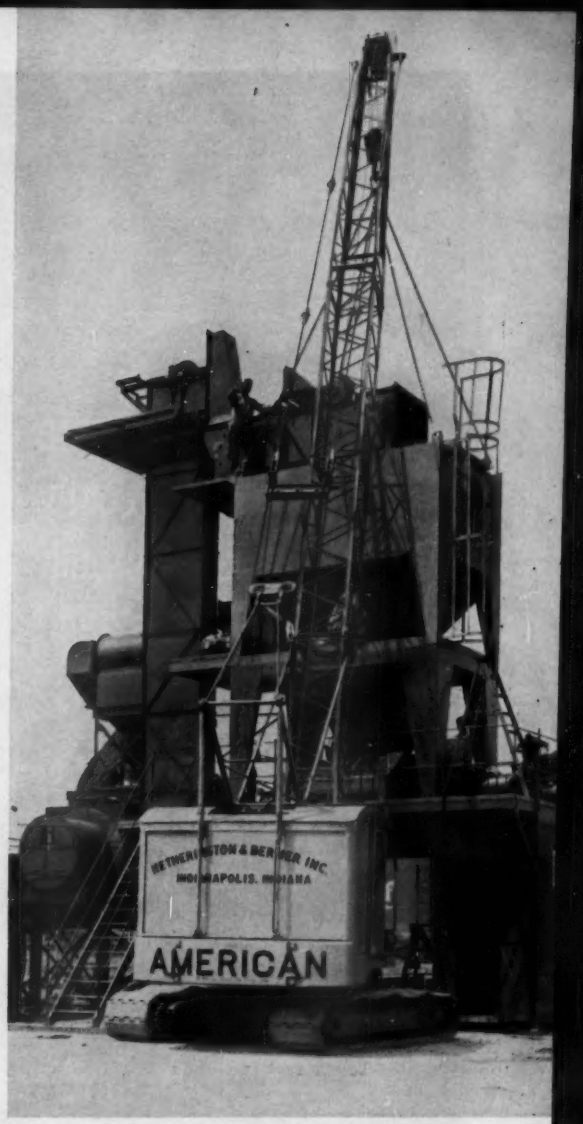
Whatever your demands, American Off-Track...On-Track Cranes assure you of top materials handling production

Here is American dependability at its best . . . boosting production on *any* materials handling job.

You can always count on the full line of American Crawlers, Truck and Self-propelled Cranes on the ground—Locomotive Cranes on Rail—to give you maximum effort in every type of work. Serving industry for over three-quarters of a century, American equipment is now better than ever . . . better than *any*. Write us for complete detailed and illustrated catalog information.

HANDLING long sections of pipe in the yard with an American 300 Series Truck Crane.

ASSEMBLY (right) of an asphalt mixing plant with a 300 Series American Crawler.



MANEUVERABILITY in crowded quarters (above) with an American Truck Crane.

HOOK WORK in the yard: American DiesELectric® Locomotive Crane.

AMERICAN HOIST
and Derrick Company
St. Paul 7, Minnesota

CROSBY-LAUGHLIN DIVISION
Drop forged fittings for wire rope-chain

EXCAVATORS-CRANES to 2 yds.-60 tons
LOCOMOTIVE CRANES to 130 tons

DERRICKS-HOISTS to 800 tons
REVOLVER CRANES to 400 tons

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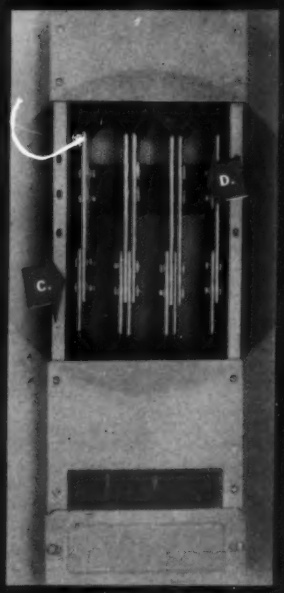
Eliminate costly factory-built "tees" and "elbows"



Cut installation and maintenance costs

FEDERAL PACIFIC'S NEW LOW IMPEDANCE BUS DUCT features a unique splicing system which permits "tees" and "elbows" to be built up on the job site using standard bus duct sections—thus eliminating costly factory-built fittings. Result: substantially lower initial cost, no delivery delays, greater flexibility and higher salvage value. Splicing system has fewer joints. Result: faster installation and less maintanance. Available in both Feeder and Plug-in types. For complete, detailed information, write for Bulletin 3-125: Federal Pacific Electric Company, General Offices: Dept. 304, Newark 1, New Jersey.

A. "TEE" MADE FROM THREE STANDARD SECTIONS—can be either forward or rearward. Only two splices instead of three on factory-built units.

B. "ELBOW" MADE FROM TWO STANDARD SECTIONS—can be either forward or rearward. Only one splice instead of two on factory-built units.

C. FEWER JOINTS PER BUS BAR—straight lengths require four instead of six joints. On larger duct only seven joints are required instead of twelve.

D. PROVISION FOR CURRENT TAKE-OFF DEVICES—A spare set of holes is provided at each splice to accommodate future additions of current take-off devices.

FPE

FEDERAL PACIFIC ELECTRIC COMPANY

The Best in Electrical Distribution and Control Equipment

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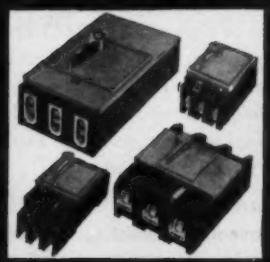
Another Engineering Achievement

now Federal Pacific introduces the

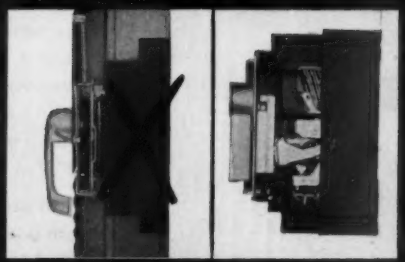
ROTARY HANDLE CIRCUIT BREAKER

it's new...



Complete line rated 15 through 800 amperes in four breaker frame sizes: EF 100a, F 225a, J 400a and M 800a

it's safe...



Rotary handle eliminates the trouble zone of external handle mechanisms, always indicates true position of breaker mechanism, provides greater dependability and safety

it locks!

Unique locking ring accommodates 3 padlocks. Can also be locked with a key

FIRST REAL CHANGE IN AB BREAKERS SINCE 1927...Obsoletes flip-handle circuit breakers. Federal Pacific's new integral handle eliminates excess, trouble-making linkage...Handle position always indicates breaker position...built big and rugged for industrial use in switchboards, control centers, control panels, panelboards, and individual enclosures—you can see this man-sized handle from a distance...Uses easy to operate rotary action...Unique locking feature for safety—Get the details of this stride forward in AB breaker design now. Write for Bulletin #1425, Federal Pacific Electric Company, General Offices: Department 328, Newark 1, New Jersey.

FPE **FEDERAL PACIFIC ELECTRIC COMPANY**

The Best in Electrical Distribution and Control Equipment

For more facts circle 558 on Reply Card

what you should know about TYPE

CHARACTERISTICS OF TYPE MI

1. Just what is MI? Here's how the NEC describes MI (Article 330): "A cable in which one or more electrical conductors are insulated with a highly compressed refractory mineral insulation and enclosed in a liquid-tight and gas-tight metallic tube sheathing." The conductors and the sheath are electrolytic copper. The mineral insulation is magnesium oxide. MI IS UL APPROVED.

2. What's so unusual about it? Since it is of all-mineral construction—copper and inert magnesium oxide—it is not subject to normal destructive influences such as heat, moisture, sunlight, oils, etc.

3. Is it flame-proof? Absolutely. Magnesium oxide is non-flammable and will not support combustion.

4. What are its temperature limits? MI may be operated continuously with ceramic terminating seals at temperatures as high as 250°C (482°F). For a "one-shot" application it may be operated at temperatures as high as the melting point of copper (1083°C). Routine Code applications which use standard terminating seals should be kept at 85°C (185°F) in the termination area.

5. Is it moisture-proof? Yes. The seamless copper sheath is impermeable to moisture. Properly applied end seals completely seal against moisture.

6. Why is it electrically safer? A grounded wiring system is safer than an ungrounded one. It is *impossible* to install MI properly without effectively grounding it.

7. What is the current rating of MI? For general use, the rating is determined by the standard end seals, which are rated at 85°C (185°F).

8. What is the working voltage of the system? The maximum working voltage is 600 volts AC or DC. Factory test voltage is 2500 volts.

MI CABLE

FOR 600-VOLT APPLICATIONS

9. What's the normal life of an MI wiring installation? MI will outlast the structure in which it is installed.

WHERE MI IS USED

10. Can MI be installed in industrial plants? It is ideal for industrial installation, because it eliminates downtime and repair work due to cable failures. MI IS UL APPROVED FOR HAZARDOUS LOCATIONS.

11. Is it useful in any type of industry? It certainly is, particularly because of its resistance to heat, moisture, oils, chemicals and other harmful influences. Successful installations have been made in pulp mills, glass factories, printing plants, chemical plants, petroleum refineries, ships, coal mines, dairies, breweries, steel mills, and many others.

12. Where else is MI used? Because of its small space requirements (no conduit or duct is required), safety and neat appearance, it has been used in schools, museums, commercial buildings, hospitals, research laboratories, and in machine tool wiring.

HOW MI IS INSTALLED

13. Is it difficult to install? No, it is very easy to install. All you have to do is cut it to length, train into position and secure it by standard clamps or straps to any surface. No conduit or duct is needed. It is easy to terminate and attach to standard boxes or equipment.

14. Can it be used with other wiring systems? Yes: MI is perfectly compatible with other wiring systems.

15. Are special boxes or equipment attachments required with MI? No. You can attach it to all standard electrical boxes, enclosures and equipment. Threaded MI cable fittings in the four standard conduit group sizes and having standard conduit threads may be ordered with the cable.

16. Do you need special tools? Only two: a sheath stripper and an end seal crimping tool. Both are available from General Cable. Except for these, regular electricians' tools are all that are needed.

17. Does MI bend easily? You can bend it by hand in the smaller diameters. In larger sizes, a standard bending tool or "hickey" will do the job easily.

18. Is special training needed to install it? No. A qualified electrician can do it simply by referring to the instructions in the Instruction Manual included with each shipment.

19. Where can fittings be obtained? Fittings may be ordered with the cable in the quantity desired. They'll be delivered with the cable.

20. How about delivery? Most sizes are available from stock. The local General Cable office nearest you can give you full details.

Ask any General Cable Authorized Distributor or your General Cable Representative—at any one of the 65 General Cable offices coast-to-coast—to pinpoint actual installations of Type MI in plants comparable to your own. For a free copy of the new 12-page Type MI Catalog, just write Dept.PE11.

GENERAL CABLE CORPORATION,
730 Third Avenue, New York 17, N. Y.
Offices and Distributing Centers Coast-to-Coast

for quality and service... specify **GENERAL CABLE**

For more facts circle 559 on Reply Card

MATERIALS-HANDLING NEWS

NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS

Jantzen tries "new kind" of caster... eliminates 98% of wheel replacements

Maintenance and materials handling men at Jantzen, Inc., manufacturers of beach and sportswear in Portland, Oregon, have solved a handling problem common to many concerns with buildings spread out over a sizeable area.

They did it by putting Bassick Floating Hub casters on transport trucks towed in trains of two to six units by power trucks for inter-building service.

Almost immediately, trucks equipped with Floating Hub casters stopped showing up on maintenance and replacement records. After five years of continuous service only 3 out of more than 160 Floating Hub casters have had to be replaced. Standard caster previously used had required replacement after 6 to 8 months.

Truck trains move at up to 15 mph over rough asphalt roadways. With Bassick Floating Hub casters, however, casters last longer, and wear and tear on trucks and roadways is greatly lessened.

Floating Hub casters on power-pulled trucks got trial run 5 years ago . . . are still going strong at Jantzen, Inc. Life of caster used previously: 6-8 months.

Behind this dramatic product, Jantzen beachwear, is an almost equally dramatic story of materials handling: caster replacement cut 98%.

Fragile Product—No! Shock Absorbing Caster—Yes!

Many companies handling materials which are not delicate, fragile nor breakable are turning to Bassick Floating Hub casters. Why? Shock absorbing construction equips these casters for extremely rough service in power pulled applications. As a result, maintenance and replacement of casters, trucks, floors or roadways is drastically reduced.

Case Hardened Casters

At Bassick 6 heat treating furnaces, other modern equipment, housed in a special department, handle approximately 5,000,000 pounds of heat treated work per year. Ball races and other parts of Bassick casters are case hardened to increase life under heavy loads, prevent wear in ball bearings. One more reason Bassick casters roll longer.

Another Caster for Minimum Maintenance

Bassick Grooved wheel casters operating on inverted angle iron tracks require minimum maintenance provide maximum efficiency. Wherever materials must move often over same route, consider an inexpensive track set up and Bassick Grooved Wheel casters. Grooved Wheel casters operate both on and off tracks—provide positive control of loads.

Where to Call

A local Bassick distributor is able and willing to help you. Call him in when you need casters and wheels. o.30

THE BASSICK COMPANY
BRIDGEPORT 5, CONN.
IN CANADA:
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Symbol of SW Excellence

Bassick
A DIVISION OF
STEWART-WARNER CORPORATION

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ROTATING & RECIPROCATING MACHINERY

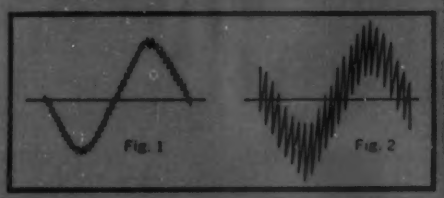
breakdown? downtime!

UNFORESEEN DELAY – MONEY LOST

New Vibraswitch 66...the Robertshaw Early Warning System that guards against extensive machinery damage

Despite the best preventive maintenance program, unforeseen machinery damage does occur. Excessive vibration is frequently the first indication of impending damage in rotating and reciprocating equipment. When harmful vibration is detected at an early stage, damage can be sharply reduced, limiting both downtime and repair costs. Latest of the industry-accepted Vibraswitch Series, the new Vibraswitch 66 provides a low-cost method of directly sensing destructive vibratory forces.

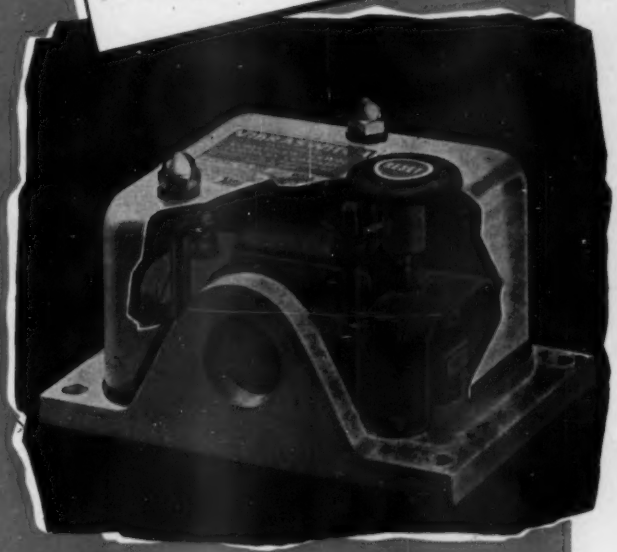
OPERATION—Machinery damage caused by excessive vibration begins with unbalance of various magnitudes. When defining the destructive characteristics of excessive vibration, it is necessary to consider both amplitude and its secondary derivative, acceleration. Figure one, normal operation, represents fundamental rotational frequency superimposed with higher frequency, low amplitude noise or chatter occurring in such vital parts as bearings and gears.



Too frequently, however, these vital parts fail, causing an increase in amplitude occurring primarily in the secondary, higher frequency vibration component, (see Figure two). Extensive damage can be prevented by early detection of these destructive forces. Robertshaw Vibraswitches detect both fundamental unbalance and harmful secondary vibration, providing twofold protection shared by no other known device.

FEATURES—Standard: maintenance-free—no moving parts (except when actuation occurs)—manual reset—wide range sensitivity adjustment—provision for shutdown or alarm. Optional: remote reset—starting or running time delays—multipoint operation.

Now less than $100 buys automatic malfunction detection



APPLICATIONS: Pumps, compressors, gas and steam turbines, centrifuges, motors and generators, diesel and gas engines, fans and blowers, gear boxes, and other rotating and reciprocating machinery.

MODELS: Vibraswitch 66—for unsheltered non-hazardous locations requiring water tight equipment. Vibraswitch 65—for hazardous locations requiring explosion-proof equipment.

Write for complete technical information.
Field offices and representatives in principal cities.

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ANOTHER IN A SERIES
OF MOTOR FACTS
FROM ALL INDUSTRIES

Sand... heavy rain... extreme heat...

Nothing stops These Westinghouse Life-Line "A" Motors

dependably driving oil well pumps in Odessa, Texas district of The Atlantic Refining Company, 24 hours per day, 7 days a week!

"Here's an application," says A. P. Johnston, production engineer at The Atlantic Refining Company, "where we must have continuous motor operation . . . sometimes for as long as 18 months . . . with virtually no maintenance or repair. Many of our pumping stations are remotely located, automatic and unmanned. Any stoppage or motor failure would result in the loss of several hundred barrels of oil. Motor repairs in the field are prohibitive in cost. We must have *complete* motor reliability and that's exactly what we get from our Westinghouse Life-Line® "A" motors."

How about you? Got a really tough motor application which you can't afford to pamper? Then ask your Westinghouse sales engineer to show you how the dependable Life-Line "A" pays for itself through reduced maintenance and repair. Or write to Westinghouse Electric Corp., P.O. Box 868, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

J-22055-R

YOU CAN BE SURE...IF IT'S Westinghouse

On this pumping unit, the 15-hp Life-Line "A" motor operates in an atmosphere of damaging dust, sand and moisture. Despite continuous, heavy-duty service, motor has never suffered any overheating since first installed. Prelubricated bearings of the Life-Line "A" eliminate periodic greasing . . . keep lubricant in . . . dirt out.

For more facts circle 562 on Reply Card

The battery that makes the difference...

C & D Slyver-Clad® provides needed extra energy to move mountains of cereal to America's breakfast tables

MORE POWER FOR QUAKER OATS

Food warehousing calls for all the most modern, efficient, and dependable material handling methods. Here at The Quaker Oats Company's four-year-old 168,000 square-foot Shiremanstown (Pa.) warehouse, electric industrial trucks bear the brunt of the lifting, lugging, stacking, and loading burden. Continuously loading and unloading 30 railroad cars, handling thousands of cars a year, keeps Quaker Oats' battery-electric trucks on the run. Credit is due the company's highly efficient scheduling, modern maintenance program, and modern, extra-energy C & D *Slyver-Clad*® lift truck batteries.

MODERN MATERIALS HANDLING

The warehouse operates on two shifts. Working on incentive basis, each lift truck driver is assigned a railroad car to load or unload. Palletized loads range between 1500 and 1800 lbs. Battery-electric trucks glide by — clean, quiet, odorless—providing the utmost in performance, efficiency, dependability, and safety . . . with no exhaust fumes to contaminate the air and foodstuffs.

MODERN MAINTENANCE

One key to this highly successful operation is The Quaker Oats Company's well-planned preventive maintenance program. Only minimum periodic maintenance is required on the electric trucks. Easily "refueled," trucks are merely backed up to the chargers. While others sleep, the C & D *Slyver-Clad* batteries are charged automatically from 11:00 P.M. to 7:00 A.M.—and the trucks are ready for another day's work.

MODERN BATTERIES TO MATCH

Second key to success in this outstanding material handling operation: C & D *Slyver-Clad* batteries. Modern plant — modern handling — modern batteries. Exclusive *Hi-Impac* jars and covers guard against breakage. Time-tested Five-Fold *Slyver-Clad* plate construction keeps "active materials" at work—for extra power . . . prevents "shedding"—to give extra life, extra dependability, and lowest cost. *For details, send for Bulletin IT-528.*

C&D

C & D BATTERIES

of Conshohocken, Pa.... Attica, Ind.

DIV. THE ELECTRIC AUTOLITE CO.

Manufacturers of *Slyver-Clad*® Industrial Batteries • PLASTICELL • and PLANICEL® Batteries for Communications, Control, and Auxiliary Power • Producers of *AutoReg*® Silicon Chargers and *AutoCel* • Charger-Battery Combinations.

*Trademark

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WHAT'S JUST AHEAD IN THIS ISSUE?

- UP IN STORAGE and down in cost is a quick summation of the solution to a warehousing problem at the Convair Astronautics plant in San Diego, California. Parts are kept within a three-story structure inside the main building; items travel by elevator and conveyor. All or part of the "skyscraper" storage arrangement can be dismantled and relocated in a relatively short time. The article about this unusual setup begins on the next page.

- SHAFT WEAR and maintenance downtime have been reduced because of the new mechanical packing seal developed to Martin's specifications. The seal, installed on the plant's autoclaves, withstands operating temperature of 330 F and internal pressure of 100 psi. For more information about the seal and its application, turn to page 98.

- MAINTENANCE COSTS CAN get away from you if you don't keep a close check on them. Moore Business Forms feel they may have the answer in the IBM control system they have set up. To find out what paperwork is involved and how the system may fit into your operations, see page 101.

- ARE YOU using intumescent paint in your plant? This type of fire-retardant coating was first applied to ceiling material in Bell and Grossett's plant in 1952 and later it was applied to wall areas. The article beginning on page 106 discusses the characteristics of this fire-retardant paint and its advantages.

- LAYOUT PLATES fabricated of concrete and epoxy cost GE's Ordnance Department only about one third that of granite or cast iron plates. The plates, used for general layout work, were designed by tool and methods personnel and built in the plant. Turn to page 114 for step-by-step instructions.

- NEED A CRANE in a hurry? Struthers Wells did, so the plant engineering department went about the job of building their own. What they did was combine parts from two different cranes to fit their particular needs. The end result was very satisfactory. To see how they did it, read the article beginning on page 117.

- WHEN YOU have 1200 buildings on 400 acres of land, with a total value of $111,000,000, maintenance is a big—and expensive—job. This is just what USAF plant engineers at Kelly Air Force Base have under their wing. By a combination of work measurement, production control in maintenance, and cost accounting, the Air Force believes it is getting "More Maintenance Per Dollar." For details on how the systems work see page 128.

Portable elevators, like this one being unloaded in the second-level work area, serve all three areas. Elevators are mesh-enclosed, are used for freight only, are self-contained and self-supporting; they are not structurally a part of stores center.

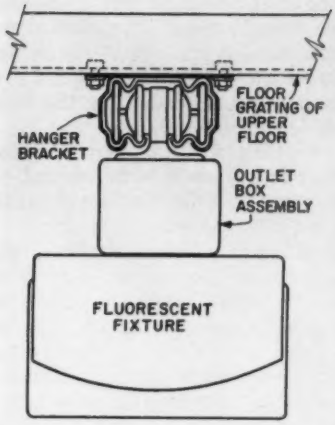
STORAGE IN AIR RIGHTS BRINGS COSTS DOWN TO EARTH

Convair saves $500,000 in first year and $150,000 annually with skyscraper storage

SPACE-ORIENTED maintenance men at Convair Astronautics have explored the profit possibilities of space . . . without leaving the ground.

In their own vast Atlas assembly plant near San Diego, Astro plant engineers hit the spatial jackpot: saved $500,000 the first year, upwards of $150,000 annually by capsuling 34,000 sq ft of usable space (the plant variety) into just 14,000 sq ft. How? Through "skyscraper" storage.

Astro's "skyscraper" is a three-level, conveyorized storage structure, a building within a building (the assembly plant). Covering but 14,000 sq ft of valuable ($30 per sq ft) assembly floor, the three-deck structure—perhaps the tallest in all industry—shelves an estimated $11 million worth of vital small parts in some 1200 bolt-together bins.



Above: Details of "walking" lights used in stores center aisles. Right: Photo shows the three walking lights that are installed in all the lateral aisleways.

The bolt-together bins are self-supporting (not a single structural steel beam is used). Just as self-supporting are two 5 ft by 7 ft portable elevators, mesh-enclosed and push-button operated, which team with a single 3 ft 6 in. wide, 42 ft long conveyor to serve all three levels.

What's more, the big structure is completely demountable. It can, for example, be unbolted and set up again in less than six weeks. Or, a section can be rearranged to serve any new mode of production.

"It is," says one plant man, "both a versatile and dynamic materials handling center . . . geared to production."

One side of the structure, for example, flanks an Atlas electronic assembly line, which it serves via a ground level issue counter. The issue counter, in turn, draws electronic parts from storage on the center's first and second levels.

Another issue counter, this one

specialized to missile hardware, flanks a hardware assembly line and dispenses parts from the structure's specialized hardware area (also on the second deck). A ground-level storage section stocks "outside vendor parts." The entire top deck—Level No. 2—serves as a commercial stores repository (issuing administrative supplies not only to the assembly building, but to the entire Astro plant).

Suppose, though, that an assembly line were shifted.

"It would pose no problems at all," states a plant engineer. "We would merely redesign the materials center and shift one wing or perhaps one entire level to serve the new line. Involved, actually, would be merely a shift in stock . . . and the loosening of a few bolts."

Flexible? "Skyscraper" storage is that, certainly. But it is more.

Built up as it is from bolted module sections (bins and uprights), each section structurally supports the next. And all add their strength to the whole.

Money in the Bank

Behind Astro's skyscraper materials center lurks not only excellent engineering but some solid economics.

Explains Chief Plant Engineer W. J. Stanley, "Previously, we warehoused these parts—more than 22,000 different items—12 miles from the plant . . . in 30,000 sq ft rented space in downtown San Diego. To get them to Atlas' final assembly, we operated a fleet of seven trucks and trailers. But costly though shuttle runs and rentals were, we simply couldn't afford to take 30,000 sq ft from final assembly. We could, however, afford 10,000 sq ft . . . stacked three tiers high."

Thus, Astro capsuled 30,000 sq ft into a mere 10,000 sq ft. The additional 4000 sq ft encompass unloading areas and the two big service counters.

Two story module structures are, of course, common across the U.S. What, though, of three?

Concedes industrial engineer R. A. Bennett, "That third story was the problem."

Nub of the problem: could a bolt-together complex, without beams, carry a three-level load? And more specifically, could it bear a load of 150 lb per square foot?

No problem was the assembly plant's floor, which was rated 5500-8000 lb/sq ft. But what of stresses within the structure itself?

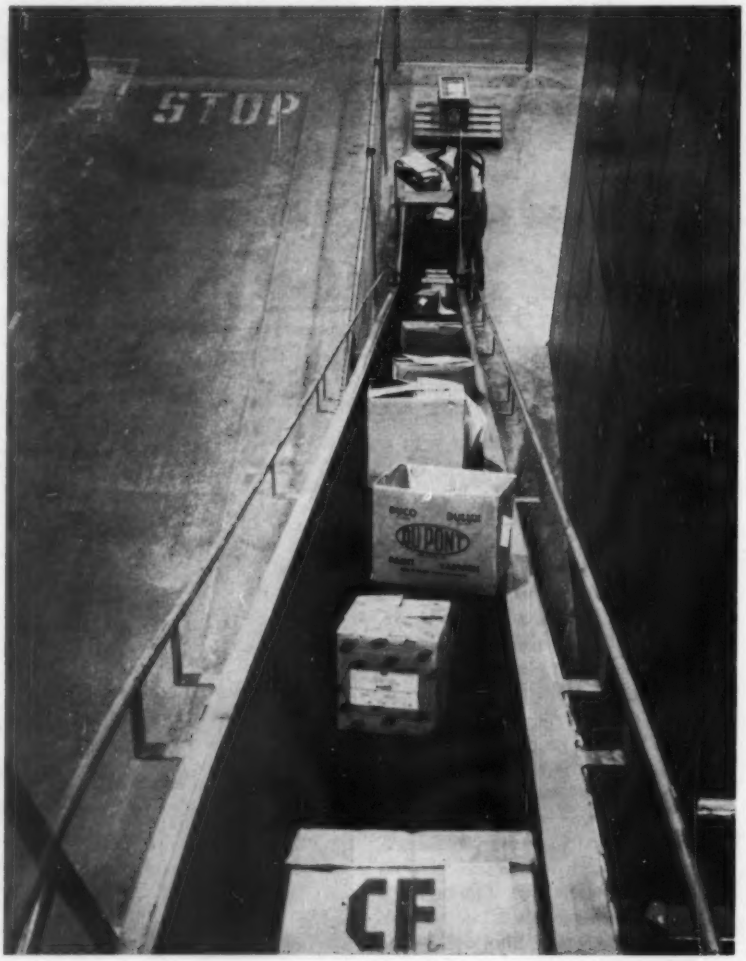
Even though, essentially, the three-level complex is standard and as one plant engineer says, "Was bought right from the manufacturer's (Deluxe Metal Products) catalog . . . bin by bin and upright by upright," some few changes were made.

Standard X-type sway braces (which would have obstructed bin depth and reach-through) were replaced by Y-gusseted sections, integrated into the structure's uprights. The design change added considerable strength where it counted most: beneath aisle gratings. Y-gussets, set atop each 8 ft 3 in. upright, act as a kind of beam, supporting the floor immediately above.

Further, all lower tier bolts and their lock-washers were torqued — to wring from the structure its maximum self-support.

In essence, then, the structure consists of three levels, each 8 ft tall. Typically, aisles are 3 ft wide (sized to Astro's standard 24 by 36 in. carts). Aisle grating is reticulated aluminum, each grating channeled to support the adjacent section.

Built by Convair Astronautics' plant engineering department, this conveyor is shown receiving supplies from in-plant train. The conveyor costs about $1500.



Ground-level issue counter in section that holds hardware for Atlas missile. Structure stores about 22,000 different items. Scales are used in re-packaging.

The 8 ft 3 in. uprights, rising tier to tier, support ten horizontal shelves which are height-adjustable (by clips) on 1-in. centers. Shelving—which forms the "bins"—is integrally strengthened.

"Shelves," points out one plant engineer, "become, in effect, the lateral support members for this bolted structure."

Bins, a maximum 3 ft deep, are the reach-through type, serving parallel aisles.

Main aisles (longitudinal) are 6 ft wide, permitting two standard Astro carts to pass. Material flow, however, is so arranged that parts move from ground level to stocking areas on each tier, thence to assigned bins . . . and finally, to issue counters at ground level without cross-over or backtracking.

Typically, the conveyor (its speed adjustable to 40 ft per minute) serves only the third tier. Two portable elevators carry hardware and electronic stores to the second level (although they can serve the third level as well). The entire structure is supplied by a regularly scheduled in-plant train.

Soon to be installed is a pneumatic tube system which will carry "issue orders" from ground level counters to "stock pickers" on the various levels. Once picked, stock travels via 2 by 3 ft drop chutes to the first level.

So fast is delivery that a rush order can be chuted to issue counters—and be in the hands of assemblers—within 60 seconds.

Equally efficient is the material center's lighting. Centered above most aisles are trolley ducts (Bulldog Universal "Trol-E-Duct") from which hang dual, reflector-mounted 4-ft slim-line fluorescent fixtures. A strap handle, within reach of materials men, permits lights to be "walked" to a bin being worked.

"So the picker literally carries his light with him," says Chief Plant Engineer Stanley.

Three "walking" lights serve each 30 ft long lateral aisle. In practice, all three may be "walked" into a bin area—if stock "picking" is concentrated there.

Typically, the duct is bolted to the overhead grating, which is actually the aisle flooring above. Riding the duct is an outlet assembly and from this hangs the fluorescent fixture. Distance from fixture to floor is 7 ft 3 in.

Reticulated, open aluminum aisle gratings serve many purposes. For one, they are extremely light for their strength. For another, being open, they pass air, thus serve to ventilate the structure. Then, too, because they are open, no additional fire sprinklers are required—since the plant's roof sprinklers reach all levels of the structure through the open-grated flooring.

Does the open grating pose problems . . . such as dirt, scuffed from above, falling through the levels?

Plant engineers say there's no such problem. Any dirt which might cling to a man's shoes is scuffed off as he walks a grated stairway to his working level (material handlers aren't permitted to ride the "freight-only" elevators). So the center's 66 inhabitants find dirt no problem whatever.

Obvious are the three-level structure's space savings. But what of dollar savings?

In justifying the center's cost, industrial engineers figured to save fully a half million dollars the first year and at least $150,000 annually thereafter.

Cost of structure, complete, was pegged at about $100,000.

Involved were some 1208 bins. Engineering estimates showed that the shelf-formed bins actually cost half as much as a similar number fabricated from wood. Besides, the steel bins could be remade—simply by adjusting the shelving—into whatever sizes the stores demanded, and at no extra cost. Bin depth could also be adjusted to fit the storage need, as could height and even width. Steel bins would be reusable—for years to come.

That was one savings. Another came with Astro's design and fabrication of the structure's conveyor. Including its 3-hp electric drive motor, the conveyor was built for about $1500.

The larger savings came, however, through the consolidation of those 30,000 sq ft of storage formerly rented miles from the assembly building. Immediately, for instance, Astro no longer needed a fleet of seven trucks and trailers to move stores warehouse-to-plant. Besides, it annually figured to save nearly $1 per sq ft rental . . . or about $30,000 a year.

Savings in rental fees and transport costs, plus other savings, has cut Astro's materials handling bill by at least $150,000 a year. **End**

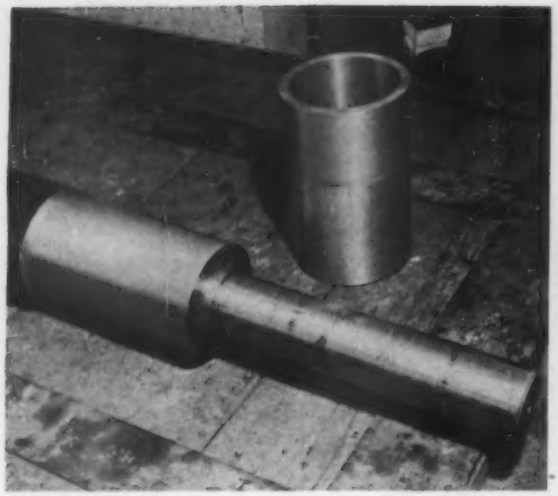


Fig. 1. View of the shaft and sleeve after the shaft has been machined to receive the sleeve but prior to installation.

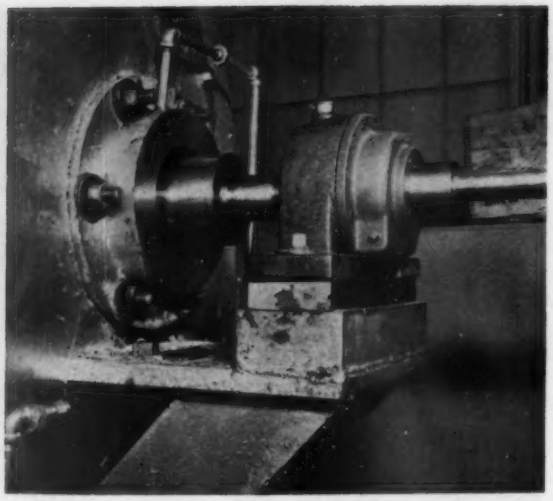


Fig. 2. Shaft is now in position on the autoclave with the sleeve press-fitted and just before installation of the seal.

NEW SEAL REDUCES SHAFT WEAR

Developed to Martin specifications, new mechanical packing seal withstands operating temperature of 330 F and internal pressure of 100 psi

By ADAM SCEPANIAK, General Foreman, Plant Maintenance, The Martin Company, Baltimore Division

WITH THE INSTALLATION of a new type mechanical packing seal, developed to our specifications, maintenance costs for servicing this equipment have been reduced.

The new seal replaces a conventional packing gland formerly used on the main drive shaft of our autoclaves. The autoclave accomplishes the bonding process for honeycomb structural material. It is a large, horizontal, cylindrical oven with inside dimensions of 122 in. and a working area of 360 degrees. The main drive shaft measures 4⅞ in. in diameter with a length of 171 in. and holds the fan which circulates the heat inside the oven chamber.

A form of lattice-braid packing was previously employed with the old gland, but it wore deep grooves in the shaft and the shaft, in turn, cut up the packing. This condition resulted in an almost continuous packing operation, representing a great maintenance expense. Finally, our maintenance men compiled a list of specific details, setting forth the exact requirements necessary for a satisfactory seal. This information was sent to the Garlock Packing Company and from it they developed the Type CA51C-10 mechanical seal.

The necessary leakproof action of the new seal is accomplished through coiled seal rings, inside the seal, expanding tightly against the shaft. The new seal, with its attendant seal rings, had to withstand operating temperatures as high as 330 F and internal pressure of 100 psi.

In operation, the new seals require at least 120 lb external oil pressure to counteract the internal pressure of the autoclave. The hydraulic power unit to supply the necessary oil is a ¾-hp unit with a rated speed of 1200 rpm. It delivers the required six gallons of oil per minute at a pressure of 120 psi.

Changeover to the new seals required an appreciable amount of rework to the shaft in the machine shop. It was necessary to turn two seal ends, and one bearing end on the pulley side, which called for precision machining of the shaft. Shaft diameter for the seals was 4.875 in., while that of the bearing ends was 2.437 in. Both of these dimen-

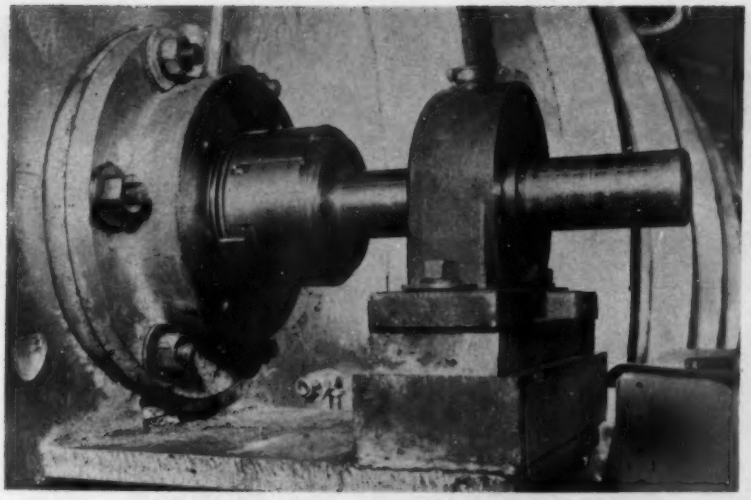
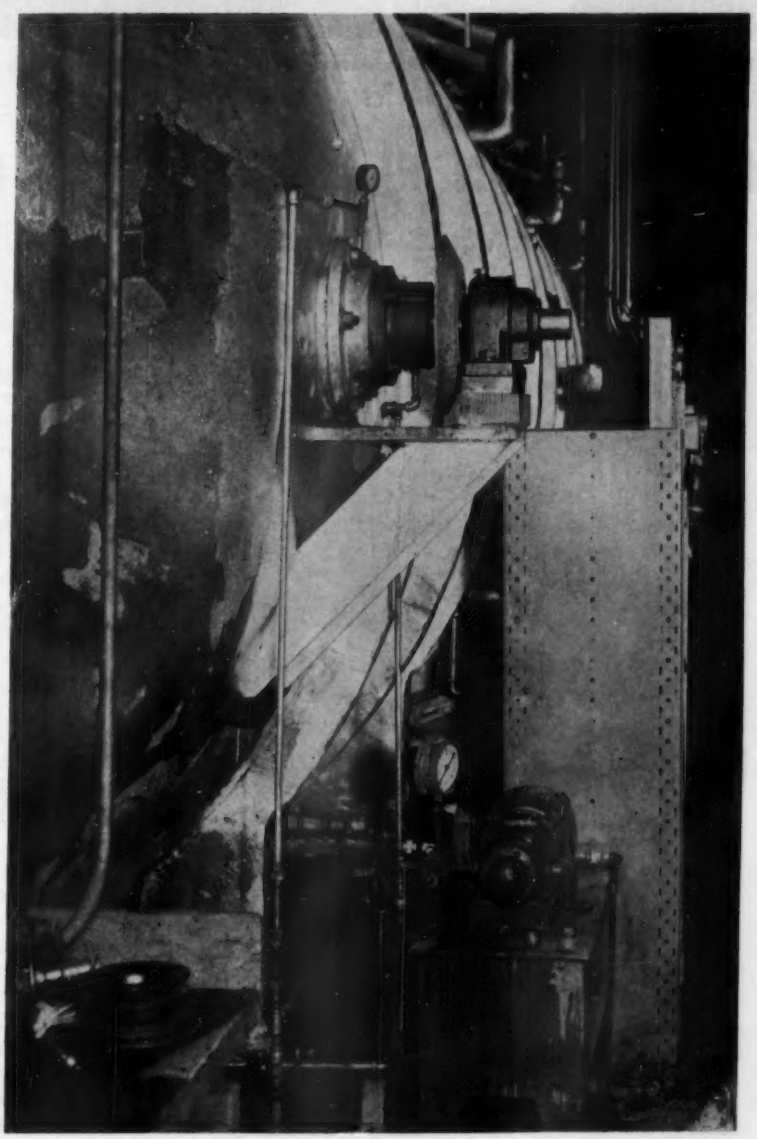


Fig. 3. View of the mechanical packing seal in place on the shaft. Modification of the fan shaft seal should cut autoclave maintenance to a minimum, with little or no downtime.

Fig. 4. With the flange mounted, installation of the seal is complete. Hydraulic oil pump on floor below shaft delivers the required six gallons of oil a minute at 120 psi pressure.



sions had to be held within a tolerance of 0.002 in.

The new seals were then installed on the shaft, and a Mechanipak gland, with its carbon ring, was bolted to the outer flange of the autoclave over the top of the seal. The hydraulic pump was installed below the drive shaft and the relief valve set at 120 psi, allowing the pump to deliver about six gallons per minute to the oil seals. On the return cycle, after passing through the seals, the oil passes through a cooler to keep its temperature down and viscosity up.

Water for the coil of the oil cooler is supplied by an electric solenoid valve piped to the cold water feed line and connected to the drive motor circuit of the pump. Before the pump was put into operation, a dry run of pressure only was applied to the seals, which proved they had been properly installed. With the hydraulic pump running, the fan shaft was then rotated to check the seals for possible leakage.

A small amount of leakage showed up on the front glands, but took up after a few hours running time. The steam booster pump was then started to raise the temperature inside the autoclave to 380 F. An air pressure of 100 psi was then fed into the autoclave. Under these conditions the seals were checked and found to be satisfactory. **End**

Fig. 1. Interior view of pickling building shows application of plastic construction to solution tanks, hoods and ductwork.

PICKLING IN PLASTIC STOPS CORROSION

Tanks, hoods, vents and fans: all plastic, all corrosion-proof

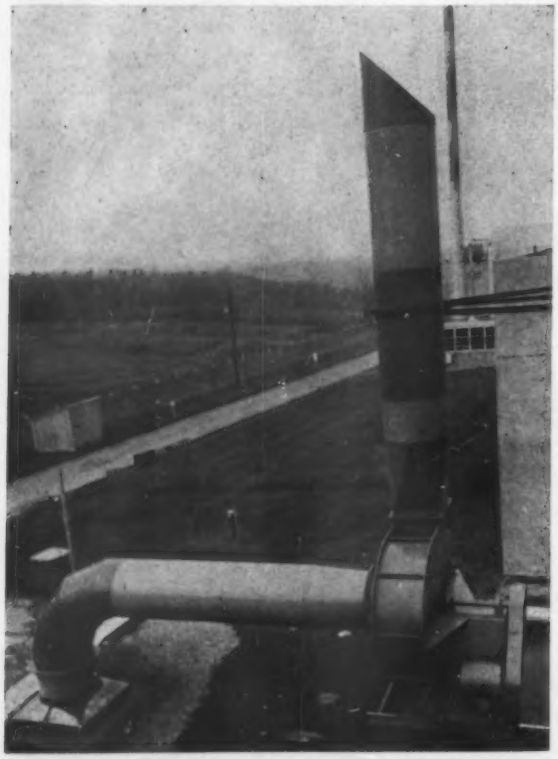


Fig. 2. Roof-mounted ventilating fan, fabricated of polyvinyl chloride sheet, exhausts corrosive pickling acid fumes from building. Ductwork and exhaust stack also made of PVC.

WHEN PICKLING, do it in plastic—that could well be the theme at General Electric's Knolls Atomic Power Laboratory, near Schenectady, N.Y. In their Nuclear Core Operation, they have installed a pickling facility constructed entirely of polyvinyl chloride and polyethylene.

Ordinarily, the standard construction of such a facility would be stainless steel, with a plastic coating. In this application, however, where warm nitric acid and hydrofluoric acid baths are being used, it was felt that solid plastic construction would negate the possibility of corrosion that would occur if the thin plastic coating were ruptured, exposing the steel.

The installation, which is being used to pickle zirconium and uranium alloys, includes these units fabricated of plastic: tanks for acid and water rinses; exhaust hoods and ductwork; exhaust fan; and a pump for discharging the highly corrosive pickling solutions to a neutralizer tank for treatment.

Manufactured by Industrial Plastic Fabricators, Inc., Norwood, Mass., the plastic units were selected by KAPL engineers for these reasons: 1. plastic (polyethylene) for containing the pickling solution is not attacked and does not contaminate the solution; 2. testing of materials shows that the polyethylene tanks should last indefinitely, while stainless steels are selectively attached at the welds and must be periodically replaced; 3. plastic for the ductwork and blower in the exhaust system was used to eliminate the corrosive action of the fumes, particularly under high humidity conditions; and 4. the plastic facility was considerably less expensive than one of stainless steel. **End**

RECORDING MAINTENANCE WORK ON PUNCHED CARDS HELPS CONTROL COSTS

System provides timely information, points out "weak links" in machinery and gives accurate story on service costs

By JOHN T. AMERY, Plant Engineer, and JOHN WILSON, Assistant Plant Engineer, both of Moore Business Forms, Inc., Niagara Falls, N. Y.

CODING CHART FOR IBM TABULATING SYSTEM

First and Second Digit	Third and Fourth Digit		Fifth Digit
TYPES OF MACHINES	MECHANICAL	ELECTRICAL	DESCRIPTION OF WORK
01. Presses	01. Drive	40. A-C Motors and Controls	1. Repair
02. Intersave Tables	02. Unwind Mechanism	41. D-C Motors and Controls	2. Replace
03. Rotary Perforating Machines A Series	03. Infeed	42. Electronic Controls	3. Clean or unplug
04. Rotary Perforating Machines AC Series	04. Plate Cylinders	43. Transformers and Switchgear	4. Inspect and/or adjust
05. Combination Machines AB Series	05. Blanket Cylinders	44. Lighting Feeders and Distribution Panels	5. Lubricate
06. Fanner Machines AF Series	06. Impression Cylinders	45. P. A. System	6. Dismantle, uncrate, relocate equipment, install

Fig. 1. Regular maintenance work is the one area where we must watch costs to detect any excessive maintenance charges. To break down this area, a five digit code was developed. Categories for each digit are illustrated above.

IN NOVEMBER, 1956, our Buffalo Avenue Plant in Niagara Falls, N. Y., decided to install a system of recording maintenance labor costs using their IBM tabulating equipment.

This plant is engaged in job printing of business forms. No stock products are made, each order is run for a specific customer. The plant has an area of 127,320 sq ft and houses 34 printing presses of varying sizes and types. In addition to the presses are the corresponding bindery machines to perform the necessary finishing operations.

Plant personnel number 351, of which 18 are machinists, 4 electricians and 2 building maintenance men.

The responsibility for establishing the new system was given to the plant engineer who was to work closely with the cost department who were setting up a similar system for the production departments. Thus, the plant engineer was in a position to create what would best serve the needs of his own department. However, the new system was a joint venture of both the engineering and accounting groups.

In practice, the work was delegated to a project engineer who worked under the supervision of the plant engineer and who was helped and advised by the tabulating accounting personnel.

Adapted to Existing System

At that time, the plant had a labor cost control system involving written job orders and manual accumulation and hand posting of costs. Wherever possible, the existing system was adapted to the new.

Much of the new system was adapted from that used by Hooker Electrochemical Company. The Hooker people were very helpful and it was on their advice that the worst pitfall of all—lack of simplicity—was avoided.

It is a temptation to design a system that will give torrents of information. However, the system machines simply give back the information they receive—correct or otherwise. If the system is too complicated, errors in coding will occur to such an extent that the total information will not be satisfactory.

It's better to have a system that will supply a minimum of information but all of it correct, and dig out any additional data needed.

The system was started December 1, 1956, and operated for a month on a "dry run" basis. The first week's results were terrible. There were so many errors that the results were almost unintelligible.

This was not too great a shock as we had anticipated such a result for the initial stages. By the end of December, the errors had been reduced to a workable amount.

Basically the new system covers

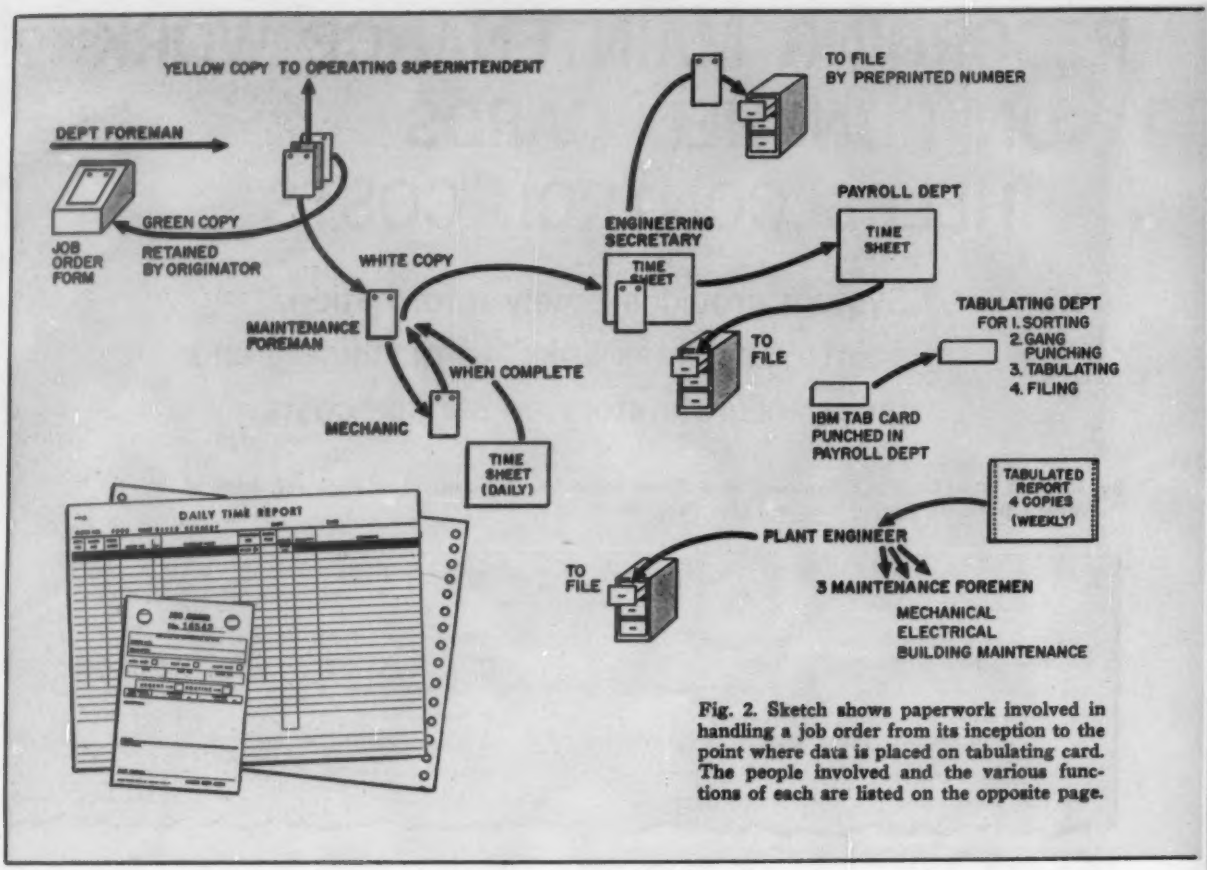


Fig. 2. Sketch shows paperwork involved in handling a job order from its inception to the point where data is placed on tabulating card. The people involved and the various functions of each are listed on the opposite page.

the three classifications into which maintenance work falls. They are:

1. Capital Work. Generally large projects for which capital money has been requested and approved. These jobs are designated by letter and number. The letters indicate the size and nature of the appropriation and the numbers run consecutively for identification. (e.g., AB501-New 22 in. letter press)

2. Planned Maintenance. Generally maintenance work that occurs often enough that money can be budgeted for it in advance. This includes all preventive maintenance work. (e.g., 901—Press No. 18 overhaul drive, 988—Battery maintenance, 981—Sharpen slitter wheels)

3. Regular Maintenance. Generally this refers to the every day, run-of-the-mill work. This includes breakdowns, minor improvements, etc., while the sum total is budgeted. This type of work is infinitely varied and must be broken down into classifications if any records are to be kept.

This is the area that must be watched to detect equipment requiring excessive maintenance, the so-called "weak links." To break down this area, a five digit code, Fig. 1, was developed as follows:

(a) First two digits—type of machine (e.g., Press, collator, power truck, etc.)
(b) Second two digits—unit of machine (e.g., Ink unit, perforator unit, etc.)
(c) Fifth digit—description of repair (e.g., Repair, lubricate, etc.)

How System Operates

The person who wants work done (usually a production foreman) makes out a job order. This job order is a prenumbered Moore form measuring 3 in. by 5 in. On this form he enters the date, department number, machine number and description of the work requested. The first or white copy is given to the foreman of either the machine or the electrical and building maintenance shop. The maintenance foreman writes on the job order the five digit code.

He then gives the job order to the man assigned to do the repair work. He uses the job orders as an aid to scheduling. After the work is completed, the mechanic enters the appropriate information on his daily timesheet.

For convenience, we have the man's name and clock number preprinted in this timesheet. This preprinting is done by the tabulating machine.

For each job done, the mechanic enters the following information on a single line of his timesheet for regular maintenance work: (1) the number of the department, (2) the machine number, (3) the time finished, (4) five digit code number (inserted by the maintenance foreman), and (5) job order number.

The above items are all copied

PROCEDURE FOR RECORDING MAINTENANCE LABOR COSTS

PRODUCTION WORKER

1. Notifies his production foreman that machine requires repairs.
2. Gets a written job order from his foreman with short explanation of trouble.
3. Delivers the written job order to the maintenance foreman.

MAINTENANCE FOREMAN

1. Enters the appropriate charge number and gives the written job order to a mechanic.

MECHANIC

1. Makes the repair.
2. Fills out timesheet at end of shift using information on job order.
3. Turns in timesheet and job order to his foreman at end of shift.

DAILY PERFORMANCES

MAINTENANCE FOREMAN

1. Looks over timesheets as post check on what crew, including night shift, did previous day.
2. Gives timesheets, completed job orders to engineering secretary.

ENGINEERING SECRETARY

1. Checks the timesheets and job orders for clerical errors.
2. Forwards the timesheets to the payroll department.
3. Files the completed job orders by numbers. (Kept on file in engineering department for one year.)

PAYROLL DEPARTMENT

1. Computes the mechanics pay from the timesheet.
2. Key punches the data onto the IBM card.

WEEKLY PERFORMANCES

TABULATING DEPARTMENT

1. Sorts IBM cards prior to running. (Separates regular (breakdown) maintenance, planned maintenance and capital.)
2. Makes the tabulating run.

ENGINEERING SECRETARY

1. Checks the special account numbers and adds any descriptive information by hand.
2. Binds in account folder.

PLANT ENGINEER

1. Checks weekly costs and investigates unusual costs.

ENGINEERING SECRETARY

1. Does necessary filing of folders.

from the job order to the timesheet except the time of completion.

Each timesheet used by the maintenance men is the same as that used by the production helpers. Even though the column headings are not significant to the mechanics, no confusion exists because of this.

The foreman checks the timesheets each morning, which is an aid in maintaining control of his working force. The timesheets and completed job orders are turned over daily to an engineering department clerk for checking. The completed job order slips are then filed by number.

Data Placed on IBM Cards

Timesheets are then sent to the payroll where IBM cards are punched using the data supplied on the timesheets. The cards are then sent to the central tabulating department which is located in another building. They are re-sorted and the tabulating runs for the engineering department are made. Both of these runs are made weekly.

Runs are received each Tuesday for the work done the preceding week. The maintenance tabulating run shows the following information: (a) department number, (b) machine number, (c) type of machine, (d) unit of machine, (e) hours worked, (f) value in dollars based on average rates, (g) clock number of mechanic, (h) the day the work was done, and (i) job order number.

The maintenance run is made, grouping the repairs by machine. In addition to weekly runs, a six months' run and a year-end run are made.

A slight variation covers capital work and planned maintenance work. For this work the mechanic enters the following information on his timesheet:

For capital work—(a) The number of the department that had the work done, (b) the machine number, (c) the capital number obtain-

(Continued on page 246)

Fig. 3. Maintenance foreman gives instructions and job order to mechanic.

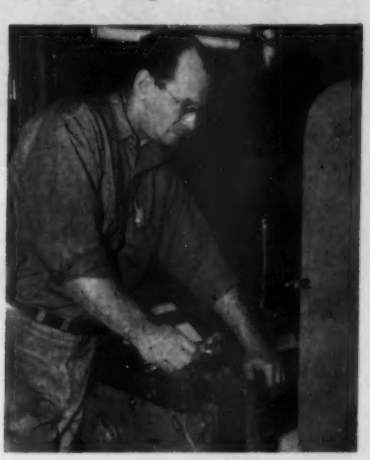


Fig. 4. Mechanic makes repairs, fills out timesheet, returns it to foreman.

Fig. 5. After repair is made, foreman examines timesheet against job order.

Fig. 6. Plant engineer checks weekly reports and investigates unusual costs.

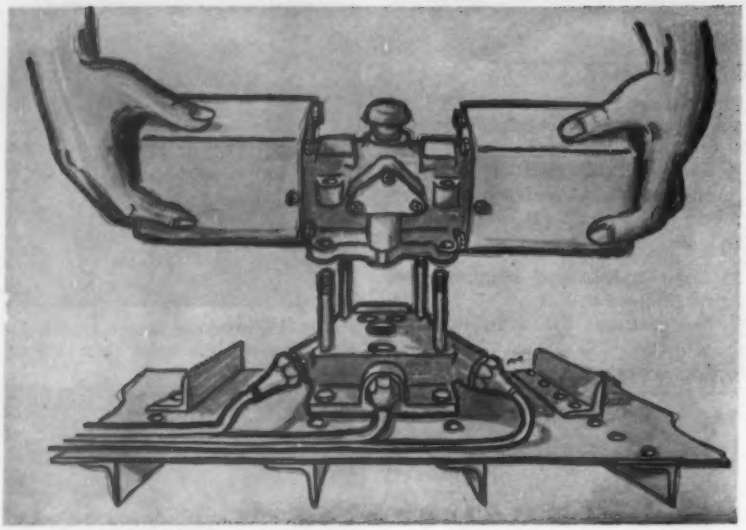


Fig. 1. All the moving parts of the valve are contained in quick-change housing.

QUICK-CHANGE VALVE . . .

Plug-in pneumatic-hydraulic unit is designed to reduce equipment downtime

By WILLIAM A. MOORE, Whittaker Controls Div., Telecomputing Corp., Los Angeles, Calif.

THE TREND toward industrial automation has forced a new appraisal of the working principles involved in a large number of mechanical devices. Among these are pneumatic and hydraulic valves. This re-examination has already resulted in important changes in the techniques and methods used to incorporate valves within automatic fluid systems.

Conventional valves are normally screwed into pipe fittings in a semi-permanent manner, often with sealing compound. Newly-developed plug-in valve units, on the other hand, permit rapid, foolproof replacement with minimum downtime. This non-productive downtime is an even more critical factor in the case of new high production machinery and control systems than formerly.

The broad concepts of automation and automatic control vary widely from industry to industry. However, in the execution of automatic production line planning, several common trends can be detected. A typical automatic production line, for example, generally includes:

1. An electronic or electromechanical system that regulates sequencing, timing and flow of production;

2. A pneumatic system to furnish the controlling forces and motions to actuate power equipment; and

3. Material handling and production equipment that can in turn be activated electrically, hydraulically, pneumatically or mechanically.

Because this three-way pattern repeats itself so often in automatic production lines, it is easy to see that hydraulic, pneumatic and process fluid control valves are inherently more numerous than ever before. In addition, these valves perform even more critical functions than in the past. Not too long ago, pneumatic and hydraulic valves were found in large numbers primarily among liquid processing or fluid handling industries. Today, full automation requires fluid valves in volume in industries where no fluids are involved in the actual production processes.

Maintenance considerations become increasingly critical when planning, designing or building an automatic production line. As a production line becomes more automatic, any breakdown or failure of even the smallest element or operating component can shut down the entire production line—with disastrous effects on production costs and output. Therefore, preventive maintenance on a programmed schedule becomes mandatory. Accessibility and quick replacement of critical parts also becomes an all-important criterion.

Considering the potential expenses and production losses involved in the case of a single valve

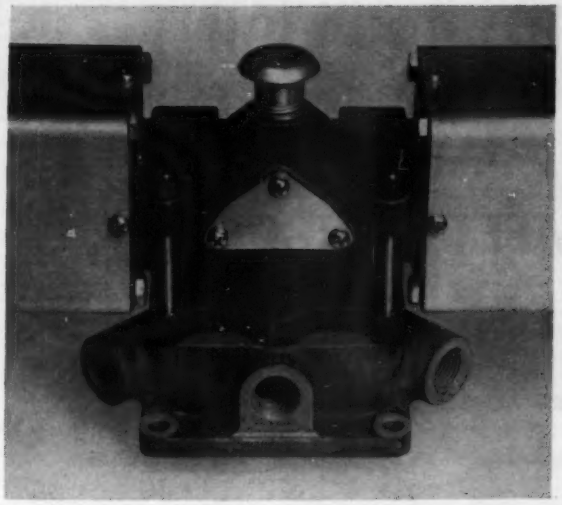


Fig. 2. Portions of solenoid covers extend from valve.

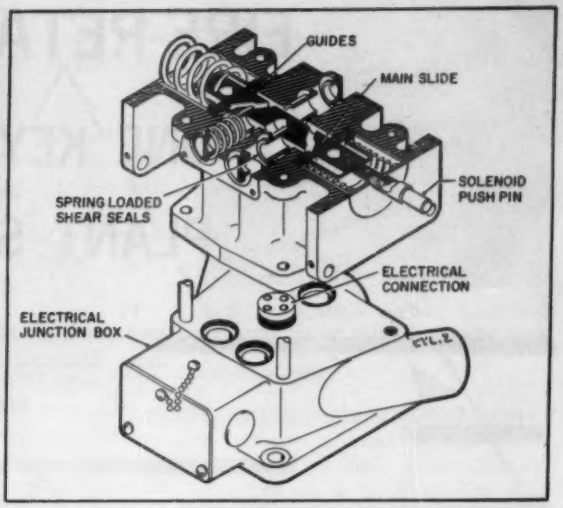


Fig. 3. Cross section gives an idea of the inside of the valve.

failure, the obvious conclusion is reached that in any automatic line, adequate techniques of valve maintenance and replacement become a primary and basic consideration.

When an electronic component fails, it is now a simple matter to plug in a replacement unit. Could valves be built on a similar plug-in principle? It has required a thorough revision of conventional ideas of valve construction and installation, but highly efficient and reliable valve units for both pneumatic or hydraulic systems are now available, each of which can be replaced as easily and rapidly as any electronic component.

A plug-in valve consists of two basic parts: the manifold, or base, and the body. See Fig. 1. The manifold is permanently attached to the basic shop pneumatic system with the fluid lines attached by conventional pipe threads. Electrical connections to furnish 60-cy power for the actuating solenoids are also permanently located at a junction box, which is an integral part of the base or manifold.

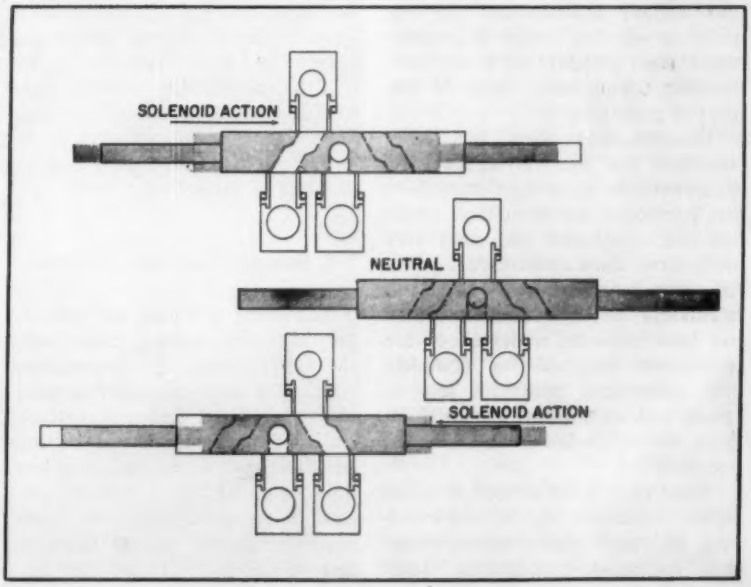
The body, containing the movable valve elements and the actuating solenoids, is designed with a flat bottom surface that fits against a corresponding top surface on the base. The flat body surface automatically seals the three pneumatic ports with O-Rings permanently attached in the manifold. At the same time a bayonet electrical connector completes the solenoid circuit. See Fig. 3. By simply tightening four nuts, a leakproof connection is obtained.

A valve of this type can be removed and replaced in less than a minute, without affecting the plumbing or electrical connections. This maintenance advantage allows the normal service men in a factory to maintain plug-in valves without need for special training or equipment.

It is, of course, entirely feasible from a technical point of view, to use all-electrical actuators in an automated setup. However, where motion or travel beyond the capacity of a normal solenoid is required, electrical motors and mechanical drives would have to be incorporated.

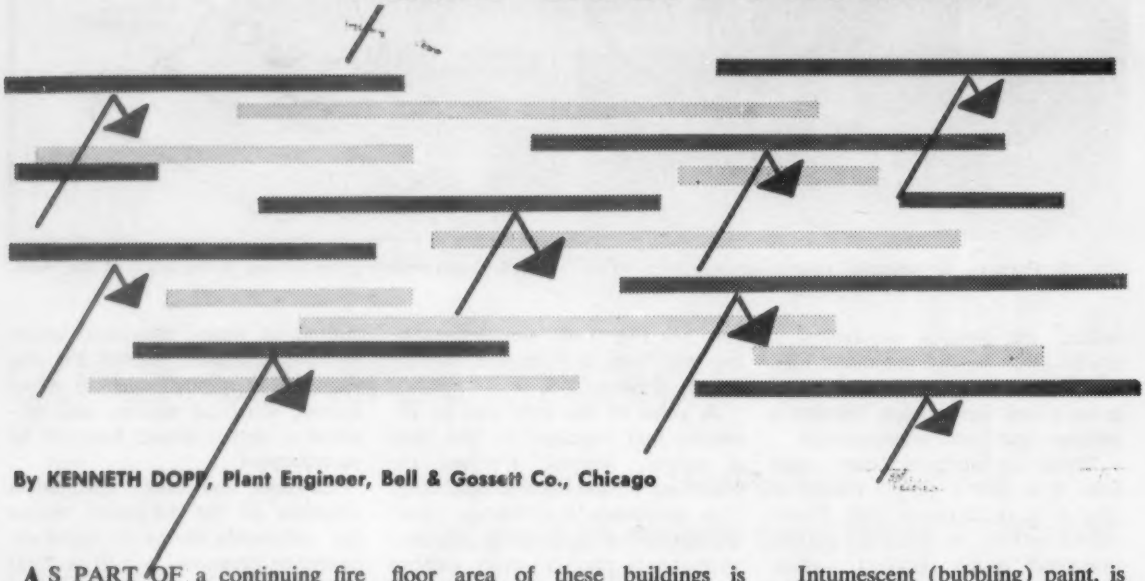
Castings and other mechanical elements of the 14-pound device are sufficiently strong to withstand operating pressures as high as 1000 psi, and can also be reinforced in further design to take care of any increases in pressure. The minimum flow passage of 0.344-inch diameter allows application flexibility. **End**

Fig. 4. When no electric current flows to either solenoid, valve remains closed.



FIRE-RETARDANT PAINT

ONE KEY STEP IN B&G's PLANT SAFETY PROGRAM



By KENNETH DOPP, Plant Engineer, Bell & Gossett Co., Chicago

AS PART OF a continuing fire safety program over the last seven years, Bell & Gossett's plant engineering department has expanded the use of both sprinkler systems and fire-retardant paint in all manufacturing and office areas. Since 1952, fire-retardant paint has been applied continually as part of our regular maintenance painting program so that today it protects more than 193,000 sq ft of combustible ceiling over about 48 per cent of plant area.

Fire-retardant paint has been specified for use throughout the plant because it provides immediate fire protection for personnel, building and equipment and costs very little more than conventional paint. In areas now protected with both sprinklers and fire-retardant paint, we have achieved a degree of fire protection designed for complete life safety and minimum loss of plant and equipment, personal injury and shut-down time in the event of fire.

Most of Bell & Gossett's working space is included in ten plant buildings of typical high-monitor, crane-bay industrial construction. Total floor area of these buildings is 237,800 sq ft. The balance of total plant area is office, warehouse, research and miscellaneous. Most of the roofs are poured gypsum, with under-roof construction of bulb-tees with fiber-type formboard serving as insulation and ceiling finish.

Fire-retardant paint was originally specified for application only to the exposed ceiling surfaces of combustible fiber board. It was felt that the vulnerability to fire damage would then be reduced considerably, since the ceilings were by far the weakest links in each building in terms of fire safety.

All Interior Surfaces Painted

Following a testing program by the plant engineering department, the application of fire-retardant paint was later extended to cover all interior roof and wall surfaces, except those of brick and concrete construction. Since that time over 3500 gal of fire-retardant paint have been applied and, of course, many more will be used in the future.

Intumescent (bubbling) paint, is one of the most common types of fire-retardant materials used in industrial buildings today. Although its appearance is the same as conventional paints, intumescent fire-retardant paint swells into a black, spongy cellular mat upon exposure to heat or flame of 300 F or over. The spongy mat, which may expand to a layer as thick as 1½ in. (depending upon thickness of application and temperature), will only char at the point where heat or flame is applied.

It will not flame or support the spread of flame or heat along the surface. The thousands of minute air cavities in the mat form effective heat insulation so that the temperature of the painted surface itself is much lower than that of the exposed surface of the mat.

In addition, a non-combustible gas blanket is formed by the chemical changes which produce the cellular mat. To repair the protected surfaces in the event of a fire, the charred intumescent paint would simply be scraped off, the surface cleaned, and new paint applied.

Fire-retardant paint may be ap-

plied over wood, metal, wall board, acoustical tile and previously painted surfaces. Surface preparation and application with brush, or spray gun is the same as for conventional decorative paints. Thus, no special equipment or skills are necessary for the regular maintenance painting to apply the fire-retardant material.

Our experience in the last seven years has shown the plant engineering department that the use of fire-retardant paint contributes to the fire-safety program in four ways:

1. **Better fire protection itself**—a. slowdown in the rate of flame spread along a painted surface (conventional paints actually promote the spread of flame), and b. heat distortion or destruction of the painted surface is either reduced or prevented entirely.

2. **Double protection with sprinklers**—the delay in flame spread provided by the fire-retardant paint reduces the floor area over which sprinklers would become operative, thus minimizing potential water damage to plant and equipment. In addition, a high level of fire protection is maintained even if the sprinkler system fails or a flash fire develops too rapidly for proper sprinkler response.

3. **Low cost**—as both a fire-retarding agent and decorative finish, the cost of fire-retardant paint is only about 15 per cent more than conventional paints for the same surfaces. Labor costs are the same.

4. **Insurance risk consideration**—the use of fire-retardant paint has been a major factor in the insurance carrier's evaluation of building fire-safety conditions.

Value of fire-retardant paint in slowing down the development of the fire is in the additional time for the local fire department to get personnel and equipment to the scene to begin extinguishing action. The delay in flame spread and consequent localization of the fire have reduced the loss in equipment and materials and, as experienced by other companies, can substantially cut the total shut-down time for reconstruction.

Thermal insulating effect of fire-retardant paint is useful in preventing heat destruction of combustible structural members (such as wood beams) and heat distortion or loss of temper in steel or aluminum members. In either case, collapse of parts of a building—and the possibility of serious injury to firemen or escaping personnel—is materially reduced.

Both combustible ceiling fiberboard and steel beams painted at same time.

Results Analyzed

A detailed analysis by the plant engineering department indicated to us that the quality of fire-retardant paint as a decorative material was at least equal to that of the paint normally used for plant maintenance. Color selection of the paint used by us, made by Albi Manufacturing Co., has been ample to allow us to retain the existing plant decorating scheme. The additional cost of the fire-retardant paint, we believe, has been offset by its double value as a decorative material and a fire-protective finish.

In common with many other insurance groups and regional rating bureaus, our insurance carrier has actively approved our fire-retardant painting program. While we have not yet received full rating credit in fire insurance, we expect to be able to save the full difference in cost of fire-retardant paint when actuarial data has been sufficient to warrant additional rate credit.

Fire-retardant paint is also applied on non-combustible structures in the plant, such as Transite welding booths, steel bins, steel racks, and all necessary wood or other combustible materials, as part of the maintenance program. Although, many of these structures will not themselves burn, any conventional paint applied to improve appearance might burn actively and promote the spread of fire. **End**

Incombustible corrugated Transite walls in welding booths are finished with buff fire-retardant paint in order to improve their appearance. Use of conventional decorative paint would not have added to safety of these plant areas.

Union Oil's big research center uses coated glass in its reception building—frosted behind the "Research" sign and a transparent tint below. Coating has now been on for a period of four years.

In applying the coating, the dispensing nozzle is moved along the window's upper edge, beginning at one side and moving toward the other. Liquid flows to bottom of window into paper trough.

SHADES OF MAINTENANCE:

TAKING THE HEAT OFF WINDOWS

A VERSATILE NEW family of glass-coating plastic compounds is taking the heat off plant windows—and enticing warm enthusiasm from plant maintenance men.

"Applied right," says engineer Frederick P. Dillon of Flair Aviation Co., "the stuff takes the heat off windows—as much as 15 degrees, maybe more. And still lets in plenty of light."

"We tinted a glass partition in our cafeteria . . . after a couple of employees nearly walked thru it. Tinted, the glass is visible . . . and walk-through proof," states plant super Milton Armstrong at Kaiser Aluminum's container facility in Los Angeles.

At Burbank, Calif.'s Collins Radio Co., building superintendent Dean Dalbey thumbs a spec sheet. "We had two outside engineering outfits figure air conditioning for this remodeling job. Both agreed we could get by with 3-tons less . . . coating plant windows with this heat-absorbing plastic emulsion."

A plant engineer in Chicago says that plastic-painted skylights in his plant "got a single application four years ago . . . and the stuff—ours is medium green in color—is still holding up fine, no cracking, crazing or peeling."

A new hue for maintenance? Plastic glass-coatings promise that . . . and considerably more.

They promise to obsolete such skylight shrouders as paint and whiting-oil compounds (and to obsolete, as well, whitewash and light-stifling lacquers which, as a kind of stop-gap measure against glare, now opaque many a plant window).

Sprayed or flowed onto skylights, partitions or windows, the material (ranging from colorless to gray frost) lets in light aplenty, yet holds back ultraviolet rays (reducing glare by as much as 96 per cent) and thwarting equally troublesome infrareds (cutting heat transmission upwards of 90 per cent).

In the process of taking the heat off plant windows, the new plastic materials (most are inorganic alkyd resins) are cutting costs—reducing outlays for air conditioning, taking the place of shades and draperies in executive suites and proving cheaper (and often as long lived) as glass tinted during the manufacturing process.

"The advantage of applying tinted coatings to clear glass," says one plant engineer, "is that you can, if you want, change the color, say when an office color scheme is changed."

"Besides," says another, "you can tint your own for a fraction of the cost of manufacturer-tinted glass."

In truth, however, most of the tinting is done by outside contractors, this because some special equipment and skills are required. Critical, for example, is the coating's thickness, which may range from four millionths of an inch to one-thousandths—or more.

"Actually," points out one industrial chemist, "these coatings aren't really new . . . though perhaps they're new to plant maintenance. Most, in principle at least, are offshoots of compounds long-used to coat optical lenses."

Eastman Kodak, for one, developed a lens-coating back in the '40s, which all but erased glare and re-

As the formula flows down the pane and spillover is caught in paper trough it is sucked up by a nozzle.

Essential to most applications is a 3-gal, dual-pump dispenser, two long handled nozzles and a viscosimeter.

flection from camera lenses. Kodak's formula contained magnesium fluoride. Vaporized under high vacuum, it was deposited as a film on lenses.

The fluoride film was exceedingly thin—about four millionths of an inch. The reason: Kodak researchers found that to thwart reflection, film thickness had to be exactly one-fourth as thick as the wavelength of the light causing the reflective trouble. Further, the coating material itself had to possess a critical index of refraction.

But chemical compounds which worked well enough on lenses ran into all kinds of trouble when subjected to the rough-and-tumble of plant usage.

For one thing, the highly critical vacuum process was both impractical and too costly for big window applications. For another, the contraction-expansion inherent in large glass areas cracked and crazed coatings which did not expand-contract precisely as did the glass itself.

Thus, though the new glass coatings may be distant cousins of lens coatings, they're miles apart chemically. The majority are compounded from what chemists call "photographic inhibitors," plus pigments and silicones (the latter, with an affinity for the glass' silicone, bond film to glass).

Plastic compounds are far more rugged, besides. As equally adept at shutting out sun glare as snow glare, they can be applied at any temperature—even below freezing. Nor does it much matter whether a window is coated inside or out (plant preference, except for hard-to-reach skylights, trends toward interior filming).

Some plant men report window coatings "still as good as new," although they've withstood four winters of wear.

Perhaps the more important difference between lens coatings and plant window compounds is their ultimate aim. In lenses, you want to stop reflection, redirecting the light and forcing it through a lens. You want, in short, all the light you can get. By contrast, anti-glare, anti-heat coatings aim at absorbing and *dispersing* (within the film layer itself) a hefty portion of the glare-causing rays.

In achieving this aim, they pass prodigious quantities of light even while blocking objectionable rays (as the ultraviolets and infrareds). What's more, they accomplish this light-segregating chore even though the finished window appears, at casual glance, to be scarcely tinted at all.

Which rays are passed and which blocked and dispersed depends in large part on the color of the coating.

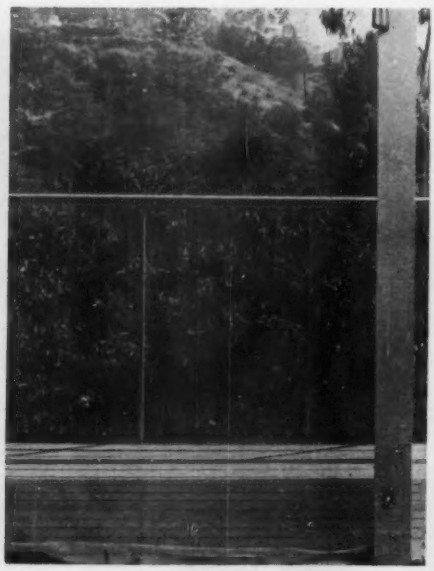
Typical is an "absorption" scale compiled by United States Testing Company, Inc., which ran tests on "Sun-Stop," tradename of one of the plastic glass-coatings (this one manufactured and distributed by Los Angeles' Transparent Glass Coatings Co.).

Reported US Testing, "The efficiency values of the various tints (as given in the Table I) . . . are based on *averages* in each phase of the spectrum; i.e., fade, glare and heat."

Obviously, what color you choose makes considerable difference. As

Making butcher paper trough which catches the spillover as it flows down pane.

This pane has been flow coated with plastic.



Tint (film color)	Efficiency Percentage Each Color		
	Fade	Glare	Heat
Clear Transparent	70	1.4	24.9
Amber Transparent	82	7.0	36.5
Green Transparent	88	41.2	44.6
Green Glare	94	65.4	50.8
Blue Transparent	81	58.8	43.7
Blue Glare	86.4	75.1	50.8
Gold Transparent	97	19	41.5
Gray Frost	99.5	95	90.5
Green Frost	99.6	96.2	89.3
Blue Frost	99.6	90	90
Auto Glare No. 2	91	53.3	47.7

one example: suppose glare is a major problem in your plant and the culprits are south-facing windows. Coating the windows with *clear transparent* film would reduce glare only 1.4 per cent and cut heat transmission but 25 per cent.

On the other hand, a darker transparent coating—"Green Glare," for instance—might be expected to reduce glare fully 65 per cent and halve heat transmission. But, in so doing, less natural light would be admitted—as indicated by the fade percentages (the more fade-thwarting a film, the less ultraviolet it passes).

The engineering decision rests with plant conditions. A maintenance staff aiming to reduce tonnage in its air conditioning system (or take the load off an existing system), might logically choose heat-ridding *blue frost* and pay a small penalty in admitted light. A drab machine shop interior might need all the natural light it could get—as with *clear transparent* (which would still reduce glare and cut heat by one fourth).

As a rule of thumb, frosted coatings pass less light than the transparent. By the same rule, they score highest in reduction of heat and glare.

Kindred compromises must be made, admittedly, for all of the plastic coatings currently being marketed by a half dozen companies, including DuPont (whose researchers developed their formula, on the market only since 1957, in conjunction with American Glass Tinting Co., Houston, Texas).

The majority of plastic compounds are "flowed" onto windows. The exceptions: spray application on rough surfaces, such as glass bricks or for very small windows.

Because flow-painting is essentially by gravity (the liquid flowing from window top to bottom), some surfaces are difficult to coat. This is particularly true of the few skylights which are horizontal, with little or no slant. Ideal are large vertical plant panes.

Essential to most applications is a 3-gallon, dual-pump dispenser (one model made by Transparent Glass Coating Co., 533 N. La Cienega Blvd., Los Angeles 48, Calif.) two long-handled nozzles (the feeder nozzle rigged with a shutoff valve) and a viscosimeter. Thickness of the finished film is dependent upon the chemical's viscosity. A viscosity of 17-18 assures an "ideal" thickness of 1/1000th inch.

Before coating, the glass is scrupulously cleaned. First, panes are washed in the usual manner. Then a razor blade scrapes off any dirt, grease or paint. Lastly, a special window conditioning chemical (also by Transparent Glass Coatings) picks up the last speck of dirt.

In applying, the dispensing nozzle is moved along the window's upper edge, beginning at one side and working steadily, without backtracking, to the other. As the formula flows down the pane (and into a waiting butcher-paper trough where it's sucked up by the other nozzle and returned to the machine's sump), the coating spreads itself evenly over the glass.

Within 4 to 6 hours the plastic is dry to the touch. Necessary, however, are another 12 to 14 days before the coating is completely dry and cured (during this time, its molecular structure changes markedly).

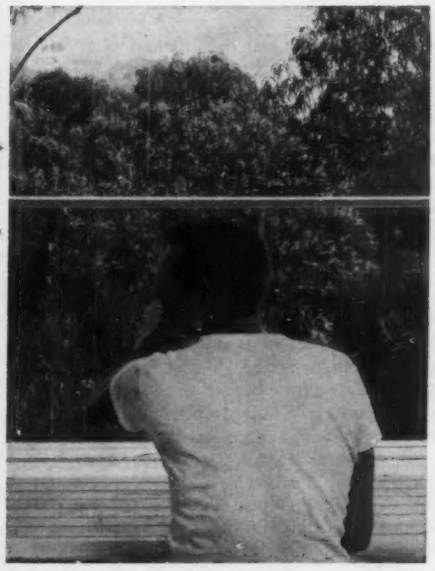
Required maintenance: sponging the pane two weeks following application (and every three months thereafter) with a low-cost cleaner-preservative. The preservative—a liquid wax—seals the coating. Once sealed, windows may be washed in the usual way.

At least one plant engineer—of a Los Angeles automotive assembly plant—said that while he was experimenting with plastic coatings, he objected to the fact that most must be removed—if they are removed—by an acetone-based chemical.

This particular plant previously had been whitewashing skylights come summer, then washing them clean again when winter's "dark days" set in. Its maintenance chief figures, however, that the new coating will let in plenty of light even during winter.

It's a problem he'll probably never face, thanks to the alkyd resin's penchant for admitting light even while shutting out objectionable rays. **End**

This pane has not. Note heightened glare.



A Plant Engineers' Manual of

HEAT EXCHANGER "LANGUAGE"

Communications and standardization . . . key words in the heat exchanger field. Communications, to simplify nomenclature; standardization, to minimize design variations. Here's a book that analyzes both facets, and does it well

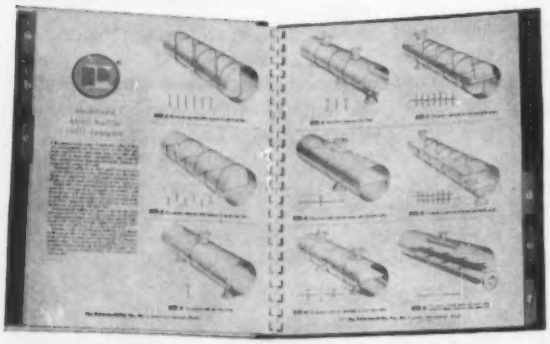
THROUGHOUT INDUSTRY—especially in the process industries—the steadily growing complexity of *what to select* in heat exchangers has been compounded by the problem of *how to choose* the proper equipment and be certain of getting the exact equipment selected.

There are hundreds of ways to approach the selection of heat exchange equipment . . . and there are thousands of different design variations possible in the construction of heat exchangers.

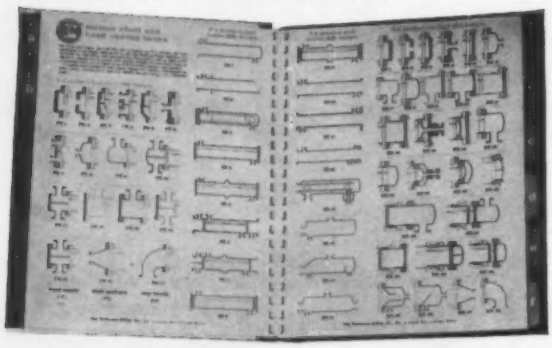
Quite often the major problem involved has been the difficulty in "talking about" equipment and components, in identifying and describing what goes into the construction and application of heat transfer equipment. To arrive at a basic understanding, Patterson-Kelley Co., Inc., has published a comprehensive manual aimed at a standard approach to the identification and specification of heat exchangers.

The company has stated the purpose of the publication as an attempt "to remove communications barriers in the selection of heat exchange equipment." To do this, thousands of design variations were run through a computer and worked down to a standard approach to components and construction—from basic designs and thermal principles to components, economics of selection and fundamental trade terminology. Final basis for selecting components was based on blending customer's requirements into economical mechanical designs which can do their job and can be economically constructed.

Standard baffles



Shell and head coding index



Color-Coded Index System

To better communicate these designs, the manual sets up a numerical and color-coded index system which is both functional and visually easy to use. The adaptation of color to the detailed drawings of the front and rear head components, for example, brings out differences between these closures. With this coding, any combination of basic design and components can be arranged to meet design requirements, permitting those charged with the specifications and purchase of equipment to identify and consider bids and to evaluate competitive quotations.

The entire manual is based on mechanical considerations because from a thermal performance point of view all designs can be constructed to operate to specifications. Economics of selection—as a matter of mechanical design—is covered thoroughly and in order of "least expensive to most expensive" for every component covered in the manual. The manual is based on a sound judgement of what is important, performance-wise and dollar-wise, to the person who assumes full responsibility every day for the performance of the heat exchangers.

To better understand what makes up a heat exchanger, the manual starts with text and diagrams to explain four basic considerations: differential thermal expansion; fluid

flow; methods of controlling fluid flow; and consideration for ease of maintenance and servicing. Principal components and materials of construction are briefly detailed.

In summarizing the first section, engineers have outlined for the first time an economical "order of importance" chart of principal heat exchanger design features associated with all basic components of heat transfer equipment.

Master Coding Index

The second section, practically the heart of the manual, illustrates and explains the master coding index—a compilation of 17 front head, 16 shell section, and 28 rear head designs—which, according to P-K engineers, can produce 99-plus per cent of all shell-and-tube heat exchangers manufactured today.

These components are explained in detail for engineers and personnel requiring minute details of heat exchanger component design. To illustrate how the coding system works, the section devotes eight pages to typical component combinations.

The third section starts with a complete table of easy-to-use nomenclature which illustrates and identifies all major designs assembled together for the first time. Detailed drawings are used to identify parts of major components. Here, again, the modular approach to component identification is carried out through color, symbol, and number —viz, FH-10 (red), SS-12 (gray) and RH-22 (blue).

Remaining pages in section three define and illustrate standard designs for gasket joint combinations, standard designs for flange facings and flange joints, tube to tubesheet joints, tube pass partitions, nozzle orientations, baffle arrangements, supports, and mountings.

A full section of text and drawings is devoted to the explanation of economic considerations in heat exchanger selection.

Economics of selection are treated in the specifics of thermal and mechanical design. This section points out how process requirements—such as flows, temperatures,

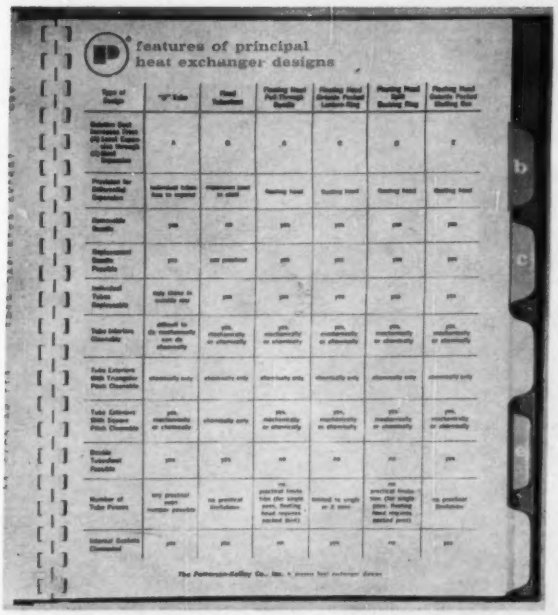
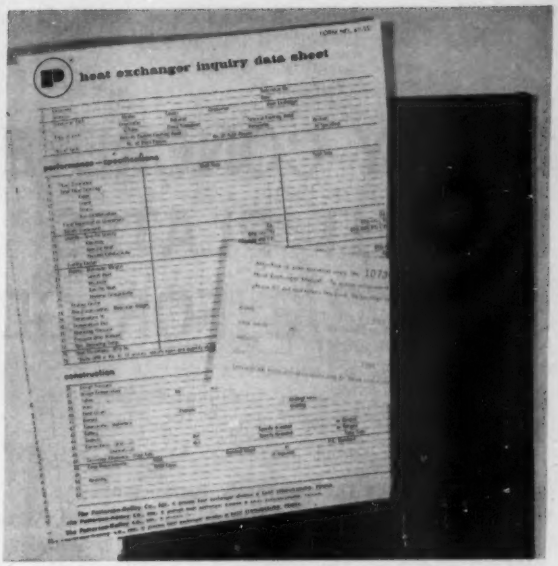

features of principal heat exchanger designs

Chart in "designs and components" section of manual presents listing of design features of various exchangers.


heat exchanger inquiry data sheet

Inquiry Data Sheet, furnished with manual, simplifies setting down flow conditions for design of heat exchanger.

pressure drop allowances, length restrictions and materials of construction—are related to the economic selection of the mechanical design of the heat exchanger.

The fifth section displays typical heat exchangers to give users examples of how different construction materials, tube pass arrangements, and other components appear when seen in application.

The Inquiry Data Sheet

In the final section, a technical design check list explains in text, and outlines in a newly-developed Inquiry Data Sheet, all necessary information required by any heat exchanger manufacturer to supply a product guaranteed on both performance and mechanical design.

The Inquiry Data Sheet is designed for a wide variety of applications, and the user can utilize all parts of the form or only what pertains to his process needs.

To complete the communication cycle, a second form —Equipment Specification Sheet—is included to show how the manufacturer's design engineers detail a heat exchanger to meet the process needs outlined on the inquiry form.

The remainder of the manual contains a series of thermal and mechanical design charts and graphs of most benefit to engineers who cooperate in the design requirements of heat exchangers. Some of the charts and graphs are standard; others are arranged in new and helpful combinations. For example, a new three-page corrosion table has been included showing how families of construction materials—when combined with carbon steel and fabricated into a heat exchanger—are arranged on an economic scale from least expensive to most expensive. **End**

To get your copy of "Heat Exchangers"

The manual—titled, "Heat Exchangers," Manual 700-A, may be obtained without cost by personnel involved in heat exchanger design and selection on request (use company letterhead and job title) to: The Patterson-Kelley Co., Inc., East Stroudsburg, Pa.

EPOXY-CONCRETE LAYOUT PLATES SAVE 2/3 FOR GE

By J. R. GOULET, Tool Methods Technician
Ordnance Dept., General Electric Co., Pittsfield, Mass.

2

1

3

4

Fig. 1. This is one of General Electric's epoxy resin-concrete layout tables holding a typically heavy weldment.

Fig. 2. Mold made of ¾-in. marine plywood braced with a frame of two-by-fours. Reinforcing pipes, 3 in. and 2 in. in diameter, are cut to protrude at both ends for handling.

Fig. 3. With the "nest" clamped in place, the space between the nest wall and master plate is filled with modeling clay.

Fig. 4. After necessary adjustments have been made in the nest and sling, surface of the plate and walls of nest are coated with a thin layer of epoxy resin. Curing follows.

SURFACE PLATES of epoxy resin and concrete have been in use by the General Electric Ordnance Department for more than 1½ years. Two such surface plates, as shown in Fig. 1, by the plant's tool and methods personnel and built within the plant, are used for general layout work. They were made at about one-third the cost of granite or cast iron surface plates of equivalent size and have proved to be entirely satisfactory.

Plates consist of a concrete slab about 13 in. thick topped with a 3/16-in. epoxy resin surface. Construction of the plate requires care, but not a great degree of skill. Our plates were required to support extremely heavy loads, so it was necessary to reinforce the concrete slabs with extra strong steel pipe and standard road-bed reinforcing wire.

Reinforcing Pipes Help in Handling

To make the slab, a mold of ¾-in. marine plywood braced by 2 in. by 4 in. frames is prepared. Provision for a 3-in. cap around the top of the slab is made by lining the walls of the mold with ¾ in. plywood planks that are cut 3¾ in. narrower than the wall. Holes are bored through the walls and the reinforcing steel pipe is put in place. The pipes are cut to protrude 8 in. on all sides, for handling the slab after the concrete sets. Pipe, 3 in. in diameter, is used for the length of the slab and 2 in. diameter pipe is used for the width.

When in place, the pipes are tack welded at each intersecting point. Sections of the reinforcing wire are set into the mold 1 in. from the top and bottom. With the 2 in. by 4 in. frames in place to prevent the walls of the mold from bulging under pressure, the mold is ready for the concrete. Figure 2 shows the mold just after the concrete has been poured.

Two-week Curing for Crack-free Slabs

After pouring, the slab is allowed to cure for two weeks. During the first week the slab is wetted frequently. It is permitted to dry gradually the second week. This method has given us slabs that are free from cracks and checks.

Since a cast object is only as good as the master from which it is cast, our best inspection granite surface plate was used to cast the epoxy resin surface. The first step is to thoroughly clean the surface of the granite plate. Then a thin coat of paste wax is applied to the entire surface plate and buffed to a high polish. The wax acts as a parting agent to release the epoxy plate from the master granite plate after the epoxy has cured.

A nest about ½ in. longer and wider than the concrete slab is then clamped on the granite surface plate as shown in Fig. 3. The nest is to confine the epoxy and serve as a mold to form the 3 in. high cap at the top of the concrete plate. Although we used 4 in. by 4 in. aluminum extrusion in the construction of the nest, any type structural material such as angle iron or channel can be used, providing that corner joints are tight enough to prevent

the epoxy from escaping. All members of the nest are waxed to prevent epoxy drippings from adhering to them and to insure a clean parting of the nest from the hardened epoxy.

Modeling clay is used as a filler, also shown in Fig. 3, between the nest wall and master plate to provide radiuses on all corners and edges in the end product. Special care must be taken to fill all nicks or deep scratches in the master granite plate with modeling clay or bee's wax, since all errors in the master plate will be cast in reverse on the epoxy plate. Nicks or scratches in the granite plate will be projections on the epoxy plate and may cause difficulty in removing the epoxy plate from the master plate.

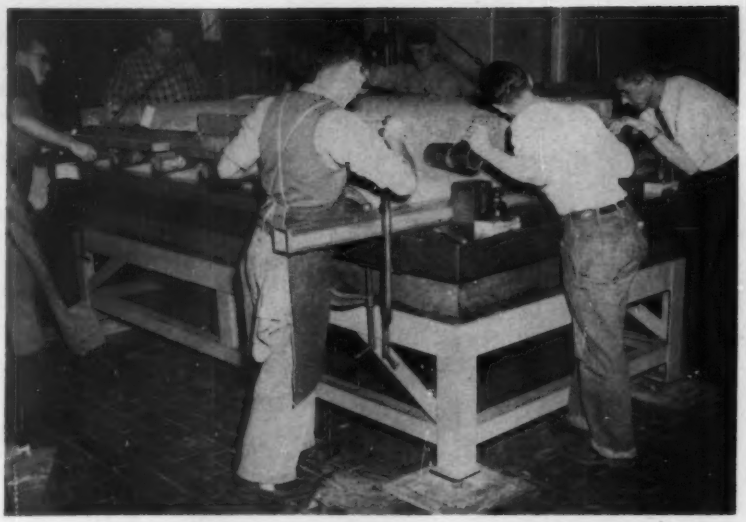


Fig. 6. Lowering concrete slab into nest. Note spacer block beneath 3-in. pipe.

The epoxy resin is mated to the concrete slab by pouring the epoxy into the nest and lowering the slab onto the epoxy. To obtain an epoxy surface of approximately 3/16 in., spacers are placed on the granite plate to support the slab at the protruding reinforcing pipes. Before the actual mating, a dry run is made. During the dry run, clearance between the nest and the slab is checked. Also, the sling hatch is adjusted to hold the slab parallel to the granite plate during the lowering operation.

After the necessary adjustments have been made in the nest and sling, the surface of the granite plate and the walls of the nest are coated with a thin layer of epoxy, as shown in Fig. 4. Glass flock is sprinkled over the epoxy and a ten hour curing period is allowed. Layers of glass cloth may be added at the corners if greater strength is required.

Since epoxy resin can be worked for only 30 minutes after a hardener has been added, it is important that a sufficient amount be mixed when the final operation is to begin. To calculate the required amount, a straight edge may be placed across the top of the concrete slab and the maximum recession or crown may be measured. To this figure 3/16 in. is added and this total is multiplied by the area of the concrete slab. Use of the right amount of epoxy together with the positive stop provided by the spacers lessens the chance of an imperfect plate or an overflow of epoxy from the nest.

Fig. 5. Epoxy is poured into the nest until a ⅛-in. layer is spread on the plate.

Paper buckets with a one gallon capacity have been found most suitable for mixing the epoxy. With the correct amount of epoxy determined, a man is assigned to each bucket and the entire quantity of epoxy is mixed at one time. The epoxy is then poured into the nest until a layer ⅛ in. thick is spread evenly across the surface plate as shown in Fig. 5. The remaining epoxy is poured at the center and toward the corners of the nest. The concrete slab is then lowered into the nest and the pressure forces the epoxy to flow from the center out to the edges. This method lessens the possibility of air pockets being trapped in the epoxy.

Before the plate is lowered to rest on the spacers, it is centered in the nest. After it has been lowered, a check is made to determine that the entire area between the 3-in. cap on the slab and the wall of the nest

(Continued on page 246)

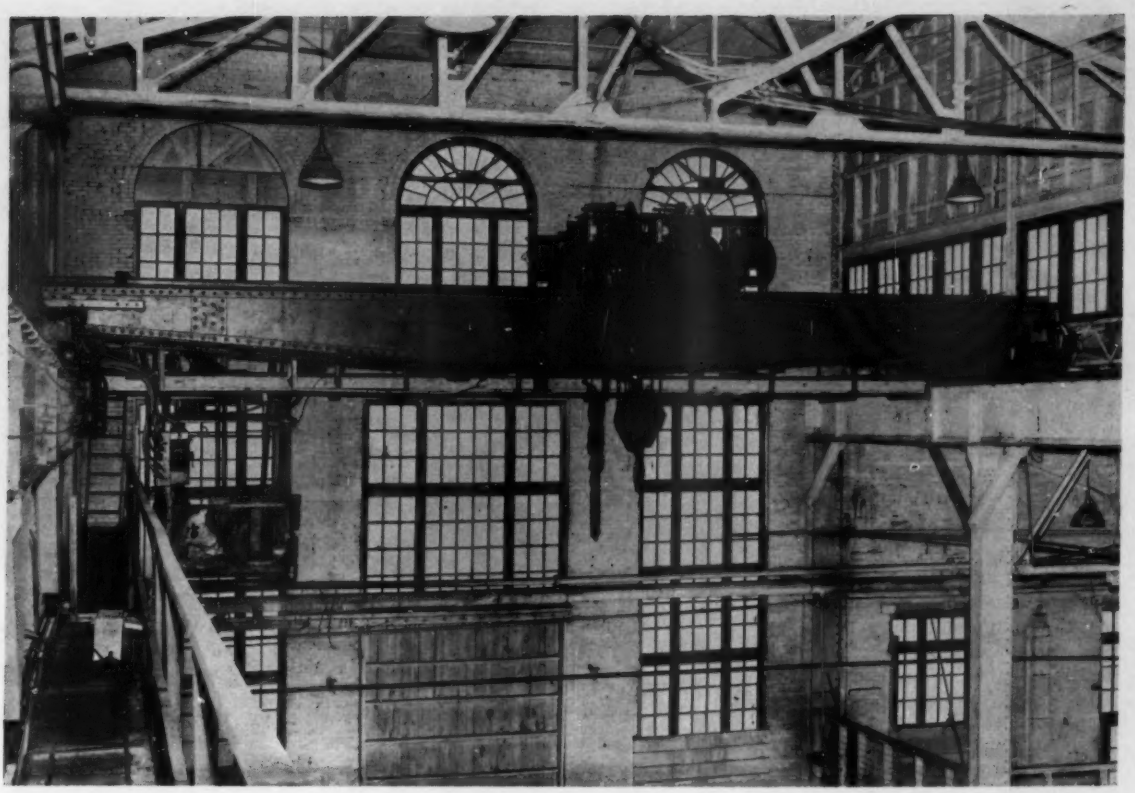


Fig. 1. View of the 20-ton crane which was fabricated by the plant engineering department, using trolley, end trucks and controls from 20-ton crane and bridge girders from 10-ton crane. It was completed and in use in two months.

TWO OVERHEAD CRANES BECOME ONE

Combining parts from two cranes, plant engineering had 20-ton crane in service within two months. And, at a cost of less than $3000

By R. A. BUTLER, Plant Engineer, Struthers Wells Corporation, Titusville, Pa.

WE NEEDED more plant operating space and the question was: "Where do we get it?" One possible answer was our shop building. The building was large enough to house the final assembly operations of our water tube power boilers.

But the building did present one problem: the overhead crane service was inadequate to handle the heavy boilers. In all other ways, however, the building was sound structurally.

Since this building had to be considered in our plans, we proceeded to tackle the problem of installing a heavier crane to service the products which would be handled in this section.

The speed and tight schedule under which the project was planned did not permit time to search the used crane market and even less time to await delivery of a new crane having the desired capacity.

Final assembly operation of our water tube power boilers, weighing up to 90,000 lb plus, were to be handled in this building. Although these boilers are large enough that they could be handled by two cranes, the existing cranes were of

only 7½- and 15-ton capacity and would obviously be subjected to excessive overloads.

Having a total of 74 overhead electric traveling cranes in varying sizes and capacities up to 50 ton scattered throughout our plant, the plant engineering department began to investigate handling requirements in the numerous manufacturing areas to determine if we might deprive one or the other of an excess or idle crane.

The crane we needed was to be at least 20-ton capacity and have a span of 40 ft ¾ in. and a 30-ft lift. From our review of existing cranes, we found a 20/5-ton I-beam girder type with a 22 ft 6 in. span built in 1913 and a 10-ton crane having a span of 57 ft 7½ in. and built in 1901.

Delving into the specifications for these two cranes, we found that we could combine parts from the two cranes and, as a result, we would be able to put together a single crane of the capacity we desired.

We had no doubts about using the trolley, end trucks, cab and controls from the 20-ton crane for the required lifting capacity. But it was obvious we could not lengthen the I-beam girders approximately 18 ft and retain their load rating without major redesign, which would be costly and time-consuming.

It was reasonable to assume, however, that the box section riveted bridge girders from the 10-ton crane could be readily shortened and, in turn, increase their load capacity to at least equal the loads to be imposed by a 20-ton trolley at the shorter span.

Accurate layouts were made of the girder profile and construction to enable calculating their properties and to check for undue vertical or lateral deflection and vibration under the full rated load of the 20-ton trolley.

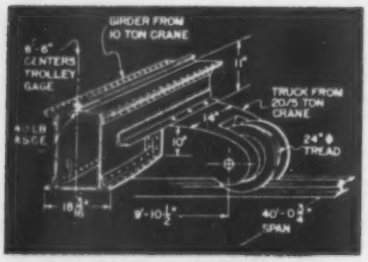
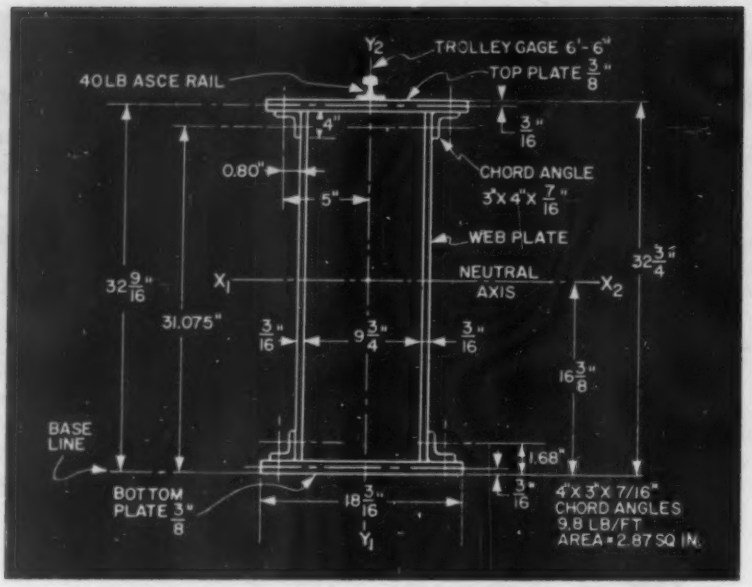


Fig. 3. Sketch of notched and seated end truck connection to the girders.

Having no choice as to the type of girders required, it was necessary only to ascertain the suitability of the structure at hand. By taking a section through the centerline of the girder, as shown in Fig. 2, it was possible to compute its properties and determine the stresses set up in tension and compression under the new loads which would be imposed at a shorter span.



Part	Area Sq. In.	Moment of Area About $X_1 - X_2$	Area Times Moment	Area Times Moment²	Inertia About Own Axis In.⁴
Top plate	6.82	32.56	222.06	7230.25	0.08
2-Chord angles	5.74	31.08	178.40	5544.65	4.4
2-Web plates	12.0	16.38	196.56	3219.65	1024.0
2-Chord angles	5.74	1.68	9.64	16.20	4.4
Bottom plate	6.82	0.18	1.23	0.22	0.08
Summation:	A = 37.12 sq in.		N = 607.89	K = 16,011	I = 1032.96 in.⁴

$$Z_c \text{ (section modulus—compression)} = \frac{I}{e} = \frac{7090.64}{16.375} = 433 \text{ in.}^3$$

$$Z_T \text{ (section modulus—tension)} = \frac{I}{e_1} = \frac{7090.64}{16.375} = 433 \text{ in.}^3$$

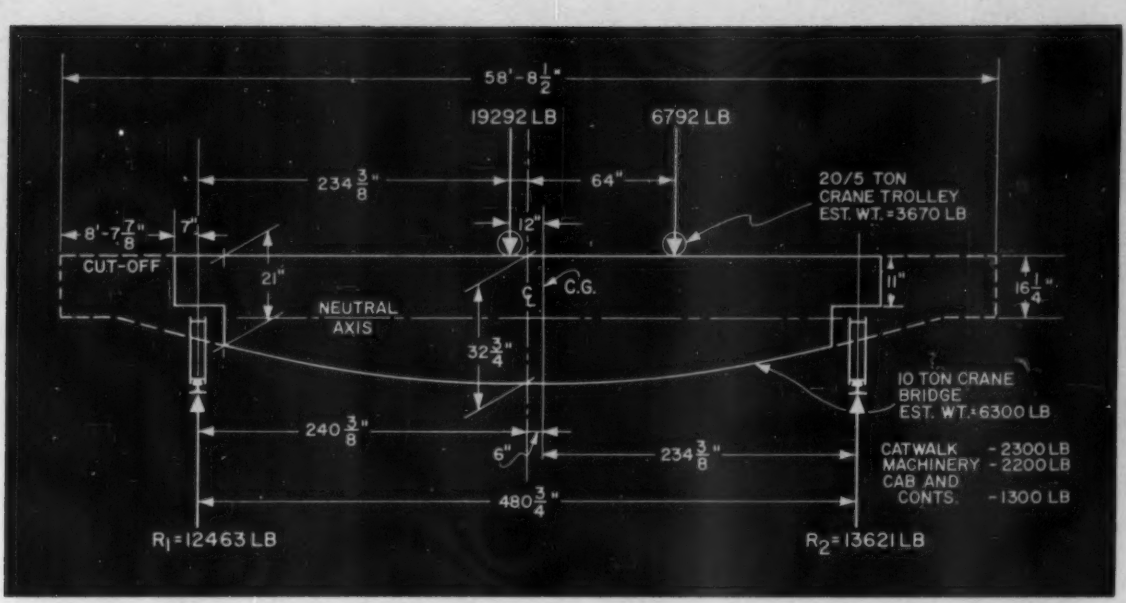
$$I = K + I \text{ parts} - Ae_1^2 = 16011 + 1032.96 - 37.12\,(16\tfrac{1}{16})^2 = 7090.64 \text{ in.}^4$$

$$e_1 = \frac{N}{A} = \frac{607.89}{37.12} = 16.375 \text{ in.}$$

Fig. 2. Computations of the properties and stresses of girder from 10-ton crane.

Since the maximum bending moments and deflection would occur in the bridge beam which carries the drive mechanism, operator's cage, controls and catwalk, in addition to its own weight and live trolley wheel loads, this section of the girder was selected for investigation.

Fig. 4 shows most of the computations entering into the study of the bridge. From the above calculations it was evident that the girders from the 10-ton crane would be suitable for the contemplated load-



$$R_1 = \frac{19292(480\tfrac{3}{4} - 234\tfrac{3}{8}) + 6792\,[480\tfrac{3}{4} - (234\tfrac{3}{8} + 64)]}{480\tfrac{3}{4}} = 12{,}463 \text{ lb}$$

$$R_2 = 26084 - 12463 = 13621 \text{ lb}$$

$$M_b = 12463 \times 234\tfrac{3}{8} + \frac{12100 \times 480\tfrac{3}{4}}{8} = 3{,}651{,}328 \text{ in.-lb}$$

$$S_c = \frac{Mb}{Zc} = \frac{3651328}{433} = 8432 \text{ psi compression}$$

$$S_T = \frac{Mb}{Zt} = \frac{3651328}{433} = 8432 \text{ psi tension}$$

Desired maximum fiber stress in compression = 9000 psi

Desired maximum fiber stress in tension = 12,000 psi

Factor of safety = 5

$$\text{Allowable deflection} = \frac{691.5}{900} = 0.76 \text{ in. for original 57 ft } 7\tfrac{1}{2} \text{ in. span}$$

$$\text{Dd (deflection dead load)} = \frac{5 \times 10800 \times 480\tfrac{3}{4} \text{ in.}}{384 \times 30{,}000{,}000 \times 1032.96} + \frac{1800 \times 480\tfrac{3}{4} \text{ in.}}{48 \times 30{,}000{,}000 \times 1032.96} = 0.157 \text{ in.}$$

$$\text{Dl (deflection live load)} = \frac{\tfrac{1}{4}\,(8670 + 40{,}000) \times 208\tfrac{3}{8}}{6 \times 30{,}000{,}000 \times 1032.96}\,(\tfrac{3}{4} + 480\tfrac{3}{4}^2 \times 208\tfrac{3}{8}) = 1.73 \text{ in.}$$

Dt (total deflection) = 1.73 + 0.157 = 1.89 in.

$$\text{Required camber} = 0.157 + \frac{1.73}{2} = 1.017 \text{ in. (old girders have 1 in. camber)}$$

Fig. 4. Calculations of the maximum bending moments of girder if equal lengths were cut off from each end of 10-ton crane.

ing at shorter span of 40 ft ¾ in.

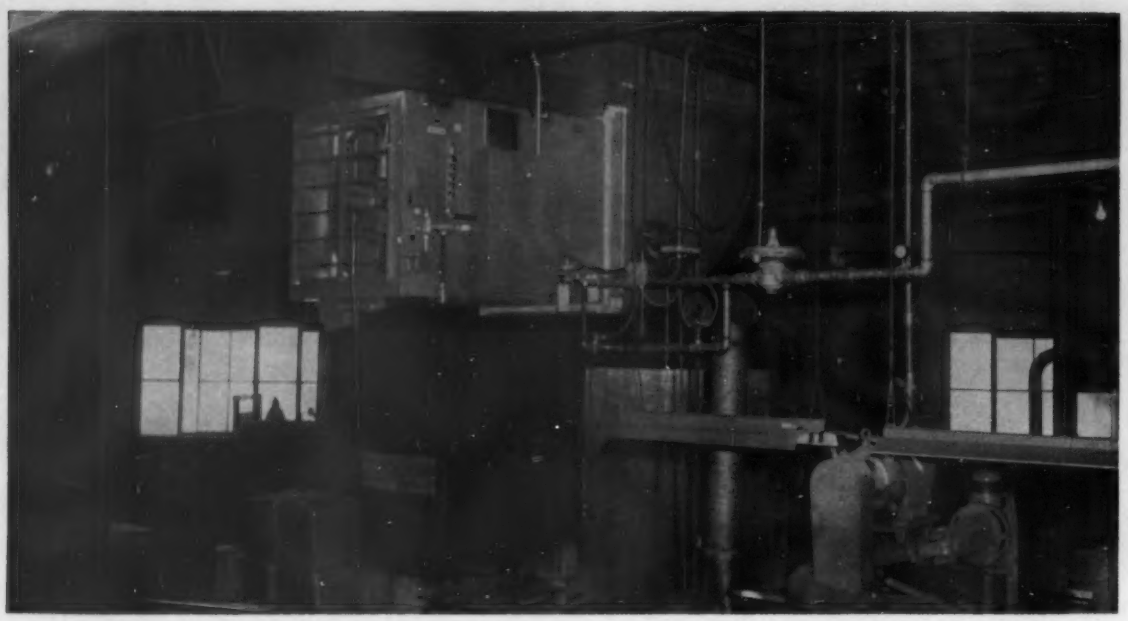
Further reference and measurements of all available manufacturers data provided the information necessary to control over-all dimensions of the crane to clear the lower chord of the building trusses and at the building columns.

This information also governed the design for assembling the bridges from the 10-ton crane to the end trucks of the 20-ton crane. A notched and seated end truck connection to the girders, as shown in Fig. 3 was necessary because of the existing limited clearance between the runway rails and the bottom chord of the roof trusses. This notched connection was preferred also because of its rigid frame characteristics and prevention of skew.

An equal length was cut off each end of the girders to preserve its symmetrical "fish-belly" shape and properties. New mounting plates were welded to the ends and these surfaces as well as their area of seating on the end trucks of the 20-ton crane were machined square and bolted in place with machine fit bolts.

After the new crane was squared and leveled, the cross shaft was lengthened and supported in permanently aligned bearings. The bridge drive machinery was then mounted to the bridge drive girder and the catwalk was installed.

The crane was completed and hoisted on its runway within two months after construction begun and at a cost of less than $3000. The climax was the first lift which weighed 105,500 lb. **End**



This 36 in. gas-fired air makeup unit, rated at 15,000 cfm and 1,600,000 Btu's, teamed up with 42 in. unit in adjacent area, provides total capacity of 35,000 cfm and 3,800,000 Btu's at Lancaster Electroplating Co., Lancaster, Ohio.

DOES MAKEUP AIR COST?

"It can cost you nothing for fuel to operate an air makeup unit." Here's one method used to prove it

By H. K. MONROE, Chief Engineer, Aerovent Fan Company, Inc. Piqua, Ohio.

MUCH has been written about air makeup—the necessity for having it, the correct way to use it and introduce it. However, many clouded and evasive statements have been made in answer to the question, "How much does it cost to operate an air makeup system?" Once we recognize that any exhaust system requires a supply of air to operate, we have a clue that will lead us to a logical, sensible, and provable method for determining the cost.

Air itself costs us nothing, but we must pay to move it in both the supply and exhaust systems. We must pay to heat it and we must pay for the equipment to provide the service of using it.

Necessity for the exhaust fan is well understood. The necessity for another capital expenditure to provide a means of tempering outside air and supplying it to this exhaust fan is sometimes difficult to see and to understand, especially if the man who okays the requisition does not live his working day in the area affected.

Air makeup is now beginning to be understood, appreciated, and used where a few years ago it was thought to be practical only for very large installations.

Let's go back to "what about the cost of operation?" I am going to make a statement that I am sure will be challenged: *It can cost you nothing for fuel to operate an air makeup unit which has all the facilities for taking air from outside, cleaning it, heating it, and discharging it into a room or duct system.* This has been proved many times. Unfortunately, few people have collected data that will prove it.

This is not a case of perpetual motion; it is simply a matter of exchange. If your plant is heated, and if you have exhaust systems, you are already paying for air makeup, but you are not receiving its benefits.

Let us consider a typical installation. We have added ventilation over the years and suddenly we recognize that we have a negative pressure condition that has built up gradually. Now we know that it is serious.

This plant has the usual heating system and it has been doing a fair job, perhaps even a very good job. All of the air for the fans is coming into the building by infiltration (whistling through any opening it can find would be a better description). The plant is warm enough to work in, so obviously this air is being heated.

It is important to consider here also that the exhaust systems which are causing all of this trouble can't possibly work as they were originally designed to work. They cannot get enough air to do the job. If you want them to work in winter as they do in the summertime when the windows and doors are wide open, you have to give them air.

What Does It Cost?

Solution to the problem? Install an air makeup system, put the required amount of air into the building so the fans can operate properly, eliminate the negative pressure. Now we have accomplished our main objective: the exhaust systems work the way we designed them.

Smoke, fumes, or dust that were backing up on us are gone and something has also happened to the climate. It becomes obvious that the drafts around the window frames and the breezes through the doorways have been eliminated. We have spent the money for the air makeup unit, now we are sure of one thing—the fuel bill will prove whether or not it costs anything to operate it. Let's look at all the figures.

In sizing the air makeup unit, we re-examined the design of our exhaust systems and added up the total volume of air they are discharging. This, in round figures, came to 90,000 cfm. We find, however, that the whole system is exhausting only 72,000 cfm without the air makeup. This means we are off our design figures by about 20 per cent. (This is a nice round number you can use for a rule of thumb; it is backed up by some pretty good experience.)

It follows then that with the air makeup system operating we are going to exhaust about 18,000 cfm more than we did before. This air has heat in it, too, so let's do a little more figuring so we will be prepared for the argument when the fuel bills begin to arrive.

Hypothetical Case

First, we have to make a few assumptions. We will start by saying that in this area, heat will be required for 30 weeks out of the year. We are operating on a 40 hour week. The records of the weather bureau show us the average daytime temperature throughout this seven month period is 39 F. We have the air makeup units set for an outlet temperature of 80 F. (This is good practice even though the room temperature may be 10 or more degrees lower.)

So the average temperature rise is 41 F (80 F — 39 F). The average Btu's required per hour are 90,000 times 1.08 times 41 or 3,980,000 Btu's. The cost for 1000 cu ft of gas is $0.81. This is 1,000,000 Btu's. Therefore, the average hourly operating cost is 3,980,000 divided by 1,000,000 multiplied by $0.87. This equals $3.23.

Since the efficiency of our direct-fired gas unit is extremely high, we could assume that we actually get the "lower heat value" for natural gas. However, being conservative, we will divide this by efficiency which will average 96 per cent. Therefore, $3.23 divided by 0.96 equals an average hourly operating fuel cost of $3.36. Thirty weeks of 40 hours each equals 1200 hours per year. Then, 1200 times $3.36 is $4032 per operating year. This certainly is an appreciable figure and at the moment may look a little frightening, but we are not through with the assumptions and the calculations yet.

You will recall that before we put in the air makeup system, we were throwing out 72,000 cfm of heated air. This air is at room temperature, say 70 F, and represents 2,410,000 Btu's per hour. If you want to check this, the formula is as follows: Btu's per hour — cfm times 1.08 times the temperature difference. (In this case, 70 F — 39 F — 31 F.)

We have been getting this heat from the boiler. It is overloaded because we have added pipes to it for years but we are getting an efficiency of 80 per cent. We can reasonably say that this 2,410,000 Btu's costs us 2,410,000 × $0.81 ÷ 1,000,000 × 0.80 — $2.44 per hour.

At this point, it looks as though we just subtract $2.44 from $3.36 and say this difference is the actual cost of operation. This is not true. If you check, you will find the difference is about 27 per cent and we know from experience that it will be 20 per cent or less.

If you will remember, we have the discharge temperature control on the air makeup unit set for 80 F and we noted that the room

Summary of Computations

$3.36	Gross cost of fuel for the air makeup unit
—2.44	Cost of heat (before air makeup) taken from plant heating system
0.92	Difference
—0.98	Value of the heat given up to the room by air makeup unit at boiler heat cost
—0.06	(This is a negative 6 cents)
0.51	Cost of additional heat when performance of exhaust system is brought up to design capacity
$0.45	Net cost per hour for fuel over and above the total over-all heating cost before the system was installed.

Table shows comparison of the amount of gas consumption and the cost per degree day units without (1957-58) and then with (1958-59) an air makeup unit.

Month	Degree Day Units		Gas Consumption		Mcf Gas/ Degree Day		Cost $/ Degree Day	
	57-58	58-59	57-58	58-59	57-58	58-59	57-58	58-59
Dec.	1047	1138	1282	1029	1.22	0.90	0.94	0.71
Jan.	1291	1537	1775	2025	1.37	1.32	1.02	0.98
Feb.	1414	1739	1516	1862	1.07	1.07	0.82	0.80
Mar.	1316	1429	1515	1594	1.15	1.11	0.88	0.84

NOTE: Gas consumption figures include process and space heating load (1957-58)—Process, space heating and air makeup heating load (1958-59).
Production increased in months covered in 1958-59 over 1957-1958 which means process gas load heavier.
In December, 1958, air makeup unit ran only during production hours. In January, February, March, air makeup unit ran 24 hours a day.
Process load is approximately 10 per cent of load—remainder is for space heating.

temperature was 70 F. This 10 degree difference represents heat which is given up to the room and goes to heat the building. So this too can be deducted from the boiler load. The heat given up by the air makeup unit to the room is 90,000 × 1.08 × (80 F — 70 F) — 972,000 Btu's per hour.

Value of Makeup Heat

Since this heat, produced at an efficiency of 96 per cent, is to be subtracted from a heating device having an efficiency of 80 per cent or less, there is something to be gained here, too. The air makeup unit is actually producing the heat included in the over-all fuel cost of $3.36. If this had come from the boiler, it would cost us 972,000 × $0.81 ÷ 1,000,000 × 0.80 — $0.98.

Now there is just one more consideration. Since we relieved the negative pressure in the building, the exhaust systems are discharging the design volume of air which is 90,000 cfm. This is 18,000 cfm more than was being exhausted before. Considering this to be 70 F air and the average outside temperature 39 F, this represents 18,000 × 1.08 × (70 F — 39 F) — 602,600 Btu's per hour. This heat comes from the air makeup unit and therefore costs us 602,600 × $0.81 ÷ 1,000,000 × 0.96 — $0.51.

The results, estimated on an hourly basis, appear in boxed item.

A quick look here tells us that the increase in our over-all fuel bill is going to be only 13 per cent of the cost of the total amount of fuel used by the air makeup unit.

This is a typical example of what happens to the fuel bill when you install air makeup units. Seldom will the cost ever go above 20 per cent of the gross fuel bill for the air makeup unit alone. I am a little disappointed that the example here did not quite prove my statement. I still believe it can, under proper conditions, cost nothing for fuel to operate a direct-fired air makeup unit.

To prove that it is not a far-fetched idea to say that heating air makeup costs you nothing, I would like to present a study of operating cost, furnished to me by William L. Pingry, a representative of the Maxon Premix Burner Company, Muncie, Indiana.

This is the report of the operation of a custom-built installation; I am a proponent of the factory-built assembly. However, we use the same ingredients.

Operating Cost Study

Here are some facts about the installation: The unit is a 12,000 cfm makeup air heater, temperature of work is from 0-10 F to 71.5 F, with a 75 F control point

Fuel consumption figures are: peak rate—1,125,000 Btu's per hour; average—500,000 Btu's per hour; minimum—45,000 Btu's per hour.

Before installing the direct gas-fired air makeup system, (12,000 cfm), several problems were encountered.

1. Because of negative plant pressures, the unit heaters which were used as a primary source of heat were down-drafting, resulting in inefficiency of combustion, inability to maintain comfortable operating temperatures in the plant, short life of unit heater heat exchangers (13 heat exchangers replaced in less than 3 years) plus a condensation problem in the vent stacks from the unit heater which actually dripped water on machinery and finished products.

2. Because of the poor combustion on the unit heaters, the plant was filled with aldehyde odors, causing eye discomfort and headache problems with the workers.

3. The main process of the plant was grinding and the exhausters were simply not doing the job resulting in heavy concentration of dirt and dust.

Installation of the air makeup system solved all of the above problems at no increased fuel consumption per degree day, see table. In fact, in three of the four months checked, fuel consumption was actually slightly lower than before even though production load had increased in the plant which should have resulted in a higher process fuel consumption. **End**

CONSTRUCTION BRIEFS

This series of articles, which has appeared bi-monthly for the past five years, is available in a set of booklet reprints. The first four cost 50 cents apiece, the last one 75 cents . . . for a total of $2.75 for the set.

The first booklet discusses beams, reaction, bending moment, shear, moment of inertia, and section modulus; the second, deflection, horizontal shear, floor loading, framing, columns; the third, columns, trusses, connections, welded connections; the fourth, fastenings for timber and a four-part series on the structural design of an industrial building; the fifth, a seven-part series on designing in reinforced concrete.

For any one, or all, of these "refresher" booklets, address the Editor, Plant Engineering, 308 E. James St., Barrington, Illinois.

HOW MUCH FUEL OIL? CHARTS GIVE ANSWER

With facts on heat loss, degree days and outside temperature, it's easy to find your fuel needs with these charts

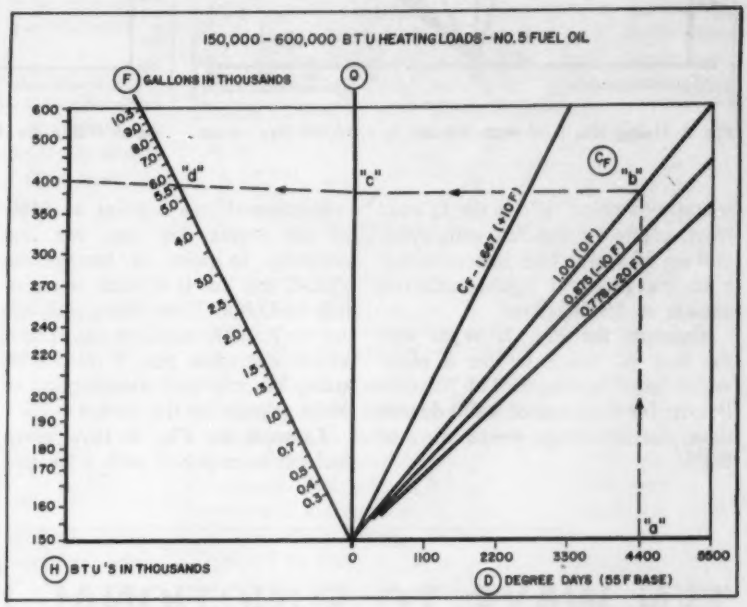


Fig. 1. Chart simplifies job of determining amount of fuel oil for space heating.

By **HARRY L. BRYMAN**, Mechanical Engineer, Brooklyn, N. Y.

THESE CHARTS will help you answer the question: "How much fuel oil will I need for heating the plant this winter?" All you need do is set down the facts, plot your line and you have the answer.

The charts are based on the recognized formula:

$$F = UHDC_F$$

where:

- U — fuel oil/ 1000 Btu / degree day
- H — heating loss in Btu/hr
- D — number of degree days
- C_F — temperature correction factor depending on outside design temperature

From tables in the *Heating, Ventilating and Air Conditioning Guide*, 1959, pages 528-537, we get the following information:

U — 0.00383 gal/1000 Btu heat loss/ degree day

The above formula is based on a 70 F inside temperature and a heating value of oil at 141,000 Btu/gal.

For our particular problem, let's assume a 60 F inside temperature and that No. 5 fuel oil is being used with a heating value of 148,000 Btu/gal.

The corrected figure would then become:

$$U = 0.00383 \times \frac{141{,}000}{148{,}000} \times \frac{60}{70} = 0.00313 \text{ gal/1000 Btu/ degree day}$$

The value for C_F is also taken from the table in the above-mentioned reference. Degree days are taken from a table for industrial heating on a 55 F base, inasmuch as the indoor temperature is assumed as 60 F.

Three Examples Show How

These three examples show how easy it is to use the charts:

Example for Fig. 1: With a heating loss of 400,000 Btu/hr, 4400 degree days, outside design temperature of 0 F, how much fuel oil is required?

Solution: From the point "a" on the D scale, extend vertically to point "b" on the C line, then hori-

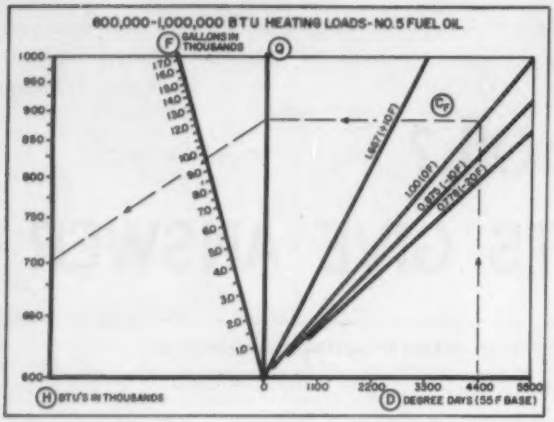


Fig. 2. Using No. 5 oil with 600,000 to 1,000,000 Btu range.

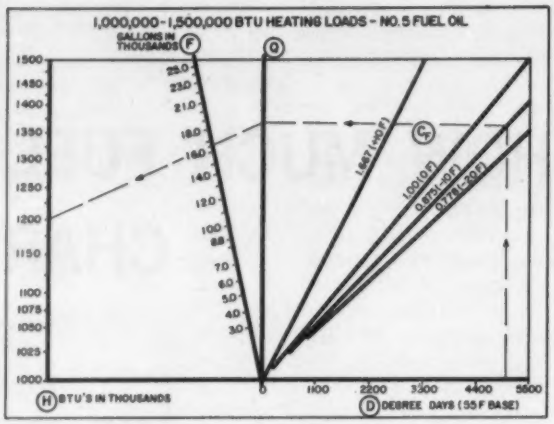


Fig. 3. Using No. 5 oil with 1,000,000 to 1,500,000 Btu range.

zontally to point "c" on the Q line. Next, connect point "c" with 400,000 on H scale. This intersects the F scale at point "d", giving required answer as 5500 gallons.

Example for Fig. 2: What will the fuel oil needs be for a plant which has a heating loss of 700,000 Btu/hr for a season of 4400 degree days, outside design temperature of 0 F?

Solution: From a point at 4400 on the degree day line, run line vertically to point of intersection with C line for 0 F, then horizontally to Q line. From this point, run line to 700,000 mark on the H line, which intersects line F at 9.650, giving the required consumption of 9650 gallons for the period.

Example for Fig. 3: How much fuel oil is required with a heating loss of 1,200,000 Btu/hr, 5000 degree days, and an outside design temperature of −10 F?

Solution: From point 5000 on degree day line, draw vertical line to −10 F, then horizontally to Q line. Connect this point of intersection with 1,200,000 mark on H line, which intersects F line at 16.5, giving fuel oil consumption of 16,500 gallons. **End**

TEN WAYS TO FUNCTIONAL LOCKER ROOMS

A NUMBER OF benefits—improved sanitation, ventilation, employee morale and property protection—can be realized by "customizing" your new locker installation.

Here are ten ways, set down by the Penco Division, of Alan Wood Steel Company, in which you can customize your locker installation to achieve these benefits:

1. Sloping Tops—These tops slope at an angle of about 30 degrees to help prevent the accumulation of dust and debris common with flat tops of standard lockers.

2. Closed Base—You can eliminate the dirt-catching area under conventional lockers by adding a steel base closure to cover the open-space beneath.

3. Raised Concrete Base—In locker rooms where floors are mopped or hosed, lockers can be protected from moisture and dirt by mounting them on a concrete base, instead of on standard steel legs.

4. Filler Panel—In many areas building columns and other obstructions interfere with the arrangement of lockers in orderly, continuous lines. Steel panels of the same steel material and finished to match the lockers can be used to fill openings.

5. Recess Trim—Where lockers are recessed into walls, in such locations as offices, there is a gap along the top and ends between the edge of the recess opening and the lockers. To improve appearance and cleanliness of recessed units, gap can be covered with molding trim.

6. Louvers—Openings in standard lockers are often inadequate to provide enough circulation. Doors can be produced with additional louvers, extending full length of door, to provide more circulation.

7. Mesh Doors—In addition to providing for air circulation to keep contents dry and fresh, mesh doors permit easy inspection without opening the doors.

8. Perforations—In lockers that are not recessed, additional air circulation can be provided by perforations in backs and tops.

9. Vertical Partitions—Where athletic clothes or work clothes are placed in the same locker with street wear, the clean clothes are often soiled by coming in contact with the dirtier ones. To overcome this, lockers can be furnished with full-length partitions extending from the back almost to the door.

10. Locks—By selecting the type of lock to match your particular requirements, you can improve appearance and convenience in addition to providing protection and control over locker contents.

Standard lockers are equipped with door handles into which padlocks can be inserted. However, master-keyed locks should be selected if there will be a need to limit and control the nature or type of items kept in lockers. **End**

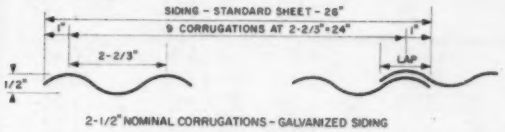
time saver series

CONSTRUCTION COST ESTIMATING PART 5

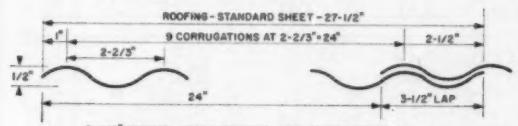
SIDING AND WINDOWS

Galvanized corrugated steel siding is widely used in the construction of steel mills, manufacturing plants and warehouses. Most commonly used corrugations are 1¼ in. and 2½ in. A 28-in.-wide flat plate corrugated, with 2½-in. corrugations produces a 26-in.-wide sheet. In structural steel framing the sheets are fastened by clips, Nelson studs or drive screws.

On galvanized siding the minimum end lap is 2 in., standard 4 in. Minimum side lap is 2 in., which leaves a weather-exposed width of 24 inches. Fasteners are spaced every 4 corrugations and the side lap fasteners every 12 in. Using a swing stage a three-man crew can put up 800 to 1000 sq ft of material a day.



2-1/2" NOMINAL CORRUGATIONS - GALVANIZED SIDING

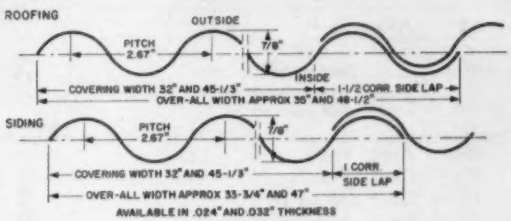


2-1/2" NOMINAL CORRUGATIONS - GALVANIZED ROOFING

Siding comes with both end corrugations down; roofing comes with one corrugation up and the other down. Roofing is laid with a side lap of 1½ corrugations and a minimum end lap of 6 in. for a roof pitch 4 in 12 or over. For roofs of less pitch the minimum end lay should be 8 in. Corrugated steel roofing is seldom used for roof pitch under 3 in 12.

Aluminum

Corrugated aluminum is being used a great deal, either in sandwich wall construction or a single sheet with an insulation backing. The sheets come with either a mill or embossed finish. The same fastener spacing is used as with galvanized sheets.



The following are some of the current prices for installing various types of siding—actual area:

Corrugated Galvanized, 18 ga.	$0.577 per sq ft
Corrugated Galvanized, 20 ga.	0.503 per sq ft
Corrugated Galvanized, 24 ga.	0.474 per sq ft
Corrugated Galvanized, 22 ga.	0.443 per sq ft
Corrugated Aluminum, .032-in. 48-1/3 in. sheet	0.617 per sq ft
Corrugated Aluminum, .032-in. 35-in. sheet	0.632 per sq ft
Corrugated Asbestos, ⅜ in.	0.719 per sq ft

SIDING

Table I. Cost per 100 Sq Ft of Installed Siding

	Aluminum		Asbestos	Galvanized			
Pitch—in.	2.67	2.67	4.2	2.5	2.5	2.5	2.5
Thickness	.032	.032	.375	18 ga.	20 ga.	22 ga.	24 ga.
Weight—lb per sq ft	.56	.56	4.1	2.3	1.78	1.51	1.25
Width of sheet—in.	47	33.75	42	26	26	26	26
Coverage—in.	45⅓	32	37.8	24	24	24	24
Side lap—corrugations	1	1	1	2 in.	2 in.	2 in.	2 in.
End lap—in.	4	4	6	4	4	4	4
Maximum length of sheet—ft	14	14	11	12	12	12	12
Cost of sheets per sq ft	.32	.32	.33	.266	.201	.175	.148
Cost of fasteners per 100 sq ft	5.00	5.00	1.75	5.00	5.00	5.00	5.00
Material per 100 sq ft of area	109	112	115	113	113	113	113
Cost of material per 100 sq ft of area	34.88	35.84	37.95	30.06	22.71	19.78	16.72
Labor cost @ $20.00 per 100 sq ft	21.80	22.40	32.20	22.60	22.60	22.60	22.60
Total cost per 100 sq ft of area	**61.68**	**63.24**	**71.90**	**57.66**	**50.31**	**47.38**	**44.32**

Closure strip: $0.14 per lin ft material + $0.01 for installation = $0.15 per lin ft, installed.
Flashing around windows and doors: 26 ga; $0.60 per ft, installed.
Stainless steel screws, neoprene washers used to fasten sheets to girts: ½-in. long, $0.04; ¾-in. long, $0.05.
Corners: installed, $0.75 per lin ft.
Labor for asbestos siding is 40 per cent higher. No side lap fasteners are used.

WINDOWS

Prices of steel windows are determined according to the locality of the job. The prices given here are for Zone A, which is the area east of the Mississippi River and includes some of the southern states. In the remainder, Zone B, prices will be 3 to 5 per cent higher.

The following costs have been worked out for various sizes of windows; the vertical numbers indicate the window models. From the square foot price, the most economical size can be determined.

If work has to be done on scaffolds, the costs will go up 15 to 20 per cent.

Table II. Architectural Projected Windows

Height (in.)		Width Including 3⅛-in. Mullion									
		28 in.		36 in.		44 in.		52 in.		60 in.	
17	Area, sq ft			4.25		5.18		6.3		7.5	
	Cost of sash			19.90		20.50		21.10		23.60	
	Cost per sq ft		261	4.69	211	3.96	221	3.35	271	3.15	
	Erect, glaze and paint			2.77		2.35		2.09		1.89	
	Total cost per sq ft			**7.46**		**6.31**		**5.44**		**5.04**	
33	Area, sq ft		6.4		8.25		10.1		12.12		13.75
	Cost of sash		21.30		22.70		23.5		24.30		25.80
	Cost per sq ft	252A	3.32	262A	2.75	212A	2.33	222A	2.01	272A	1.88
	Erect, glaze and paint		1.97		1.80		1.63		1.51		1.44
	Total cost per sq ft		**5.29**		**4.55**		**3.96**		**3.52**		**3.32**
49	Area, sq ft		9.55		12.28		15.0		18.0		20.45
	Cost of sash		23.60		25.10		26.20		27.10		30.80
	Cost per sq ft	253	2.47	263	2.05	213	1.75	223	1.51	273	1.50
	Erect, glaze and paint		1.61		1.50		1.49		1.30		1.22
	Total cost per sq ft		**4.08**		**3.55**		**3.24**		**2.81**		**2.72**
65	Area, sq ft			16.25		19.8		23.8		27.1	
	Cost of sash			27.60		28.8		30.0		34.2	
	Cost per sq ft		264	1.70	214	1.46	224	1.26	274	1.26	
	Erect, glaze and paint			1.35		1.26		1.20		1.16	
	Total cost per sq ft			**3.05**		**2.72**		**2.46**		**2.42**	

Cost of double strength, B grade glass = $0.50 per sq ft; installation, $0.25 per sq ft; painting both sides, $0.13 per sq ft. Total cost of glass, installed in painted sash = $0.88 per sq ft.

Based on 6000 sq ft of window area: Sash 28 in. wide costs $6.95 to erect
Sash 36 in. to 64 in. wide costs $7.60 to erect
Sash 84 in. wide costs $10.70 to erect

Screens will increase these costs about 34 per cent. Aluminum sash costs twice as much as steel sash.

Table III. Double Vented Architectural Projected Windows

Height (in.)		Width Including 3⅛-in. Mullion							
		36 in.		44 in.		52 in.		60 in.	
65	Area, sq ft	16.25		19.8		23.8		27.1	
	Cost of sash	38.70		39.90		41.10		46.80	
	Cost per sq ft	265	2.38	215	2.01	225	1.73	275	1.73
	Erect, glaze and paint		1.35		1.26		1.20		1.16
	Total cost per sq ft		**3.73**		**3.27**		**2.93**		**2.89**
81	Area, sq ft	20.25		24.75		29.7		33.8	
	Cost of sash	41.20		42.60		44.00		50.2	
	Cost per sq ft	266	2.04	216	1.73	226	1.48	276	1.48
	Erect, glaze and paint		1.26		1.19		1.14		1.11
	Total cost per sq ft		**3.30**		**2.92**		**2.62**		**2.59**
97	Area, sq ft	24.25		29.6		35.6		40.5	
	Cost of sash	44.20		46.30		47.90		54.60	
	Cost per sq ft	268	1.82	218	1.57	228	1.35	278	1.35
	Erect, glaze and paint		1.32		1.24		1.18		1.15
	Total cost per sq ft		**3.14**		**2.81**		**2.53**		**2.50**

Based on 6000 sq ft of window area:
Sash 36 in. to 60 in. wide costs $7.60 to erect (65 in. to 81 in. high)
Sash 36 in. to 60 in. wide costs $10.70 to erect (97 in. high)
Screens will increase these costs about 34 per cent. Aluminum sash costs twice as much as steel sash.

Table IV. Commercial Windows (Fixed)

Height (in.)		Width Including 3⅛-in. Mullion 36 in.		48 in.		64 in.		84 in.	
33	Area, sq ft		5.5		11.0		14.7		19.3
	Cost of sash	A12	6.30	B22	6.90	A32	8.30	A42	11.10
	Cost per sq ft		1.15		.63		.57		.58
	Erect, glaze and paint		2.14		1.57		1.40		1.43
	Total cost per sq ft		3.29		2.20		1.97		2.01
49	Area, sq ft		8.2		16.3		21.6		28.4
	Cost of sash	A13	7.40	B23	8.60	A33	10.70	A43	14.60
	Cost per sq ft		.91		.53		.50		.52
	Erect, glaze and paint		1.73		1.35		1.23		1.26
	Total cost per sq ft		2.64		1.88		1.73		1.78
65	Area, sq ft		10.8		21.6		29.0		38.0
	Cost of sash	A14	8.70	B24	10.30	A34	13.10	A44	18.30
	Cost per sq ft		.81		.48		.45		.48
	Erect, glaze and paint		1.53		1.23		1.14		1.16
	Total cost per sq ft		2.34		1.71		1.59		1.64
81	Area, sq ft		13.5		27.0		36.0		47.3
	Cost of sash	A15	10.00	B25	12.00	A35	15.50	A45	22.00
	Cost per sq ft		.74		.45		.43		.47
	Erect, glaze and paint		1.40		1.16		1.09		1.11
	Total cost per sq ft		2.14		1.61		1.52		1.58
97	Area, sq ft		16.1		32.2		43.0		56.5
	Cost of sash	A16	11.50	B26	13.70	A36	17.90	A46	25.70
	Cost per sq ft		.72		.43		.42		.46
	Erect, glaze and paint		1.36		1.21		1.13		1.07
	Total cost per sq ft		2.08		1.64		1.55		1.53

Based on 6000 sq ft of window area:
Sash 36 in. to 64 in. wide, up to 97 in. high, costs $7.60 to erect
Sash 97 in. high, any width, costs $10.70 to erect
Sash 84 in. wide, any height, costs $10.70 to erect
Aluminum sash costs 3½ times as much as steel sash.

Table V. Commercial Projected Windows

Height (in.)		Width Including 3⅛-in. Mullion 24 in.		48 in.		64 in.		84 in.	
33	Area, sq ft		5.5		11.0		14.7		19.3
	Cost of sash	A12120	15.10	B22140	17.40	A32160	19.80	A42140	21.60
	Cost per sq ft		2.75		2.58		1.35		1.12
	Erect, glaze and paint		2.14		1.57		1.40		1.44
	Total cost per sq ft		4.89		4.15		2.75		2.56
49	Area, sq ft		8.2		16.3		21.6		28.4
	Cost of sash	A13121	15.90	B23141	19.10	A33161	22.20	A43141	23.60
	Cost per sq ft		1.95		1.17		1.03		.83
	Erect, glaze and paint		1.73		1.35		1.23		1.26
	Total cost per sq ft		3.68		2.52		2.26		2.09
65	Area, sq ft				21.6		29.0		38.0
	Cost of sash			B24141	20.80	A34161	24.60	A44141	26.80
	Cost per sq ft				.97		.85		.71
	Erect, glaze and paint				1.23		1.14		1.16
	Total cost per sq ft				2.20		1.99		1.87
81	Area, sq ft				27.0		36.0		47.3
	Cost of sash			B25141	22.50	A35141	27.00	A45141	30.00
	Cost per sq ft				.83		.75		.64
	Erect, glaze and paint				1.16		1.09		1.11
	Total cost per sq ft				1.99		1.84		1.75
97	Area, sq ft				32.2		43.0		56.5
	Cost of sash			B26141	24.20	A36141	29.40	A46141	33.20
	Cost per sq ft				.76		.69		.59
	Erect, glaze and paint				1.21		1.13		1.07
	Total cost per sq ft				1.97		1.82		1.66

Based on 6000 sq ft of window area:
Sash 24 in. wide costs $6.95 to erect
Sash 48 in. to 64 in. wide costs $7.60 to erect (up to 97 in. high)
Sash 48 in. to 64 in. wide costs $10.70 to erect (97 in. high)
Sash 84 in. wide costs $10.70 to erect
Screens will increase these costs about 41 per cent. Aluminum sash costs three times as much as steel sash.

WORK MEASUREMENT EARNED HOUR REPORT

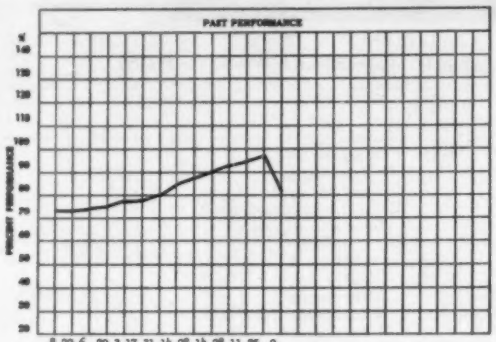
WORK CENTER	ORGANIZATIONAL CODE
Paving and Railroad Unit	39331 BAMEL
SUPERVISOR	PAY PERIOD ENDING
C. H. Ridgeway	9 May 1959

I. DIRECT LABOR

A. PRODUCT LINE	EARNED	ACTUAL	%
.11 PRODUCT: ON BASE	1,676	2,044	82
.12 PRODUCT: OFF BASE			
(1) TOTAL DIRECT	1,676	2,044	82

B. INDIRECT LABOR

.21 SUPERVISION	19.0%	318	382	83
.22 CLERICAL				
.23 STAFF ASSIGN				
.24 REPAIR OF OWN WC EQUIPMENT	0.1%	2	-0-	-0-
.25 STANDBY		-0-	5½	-0-
.26 MISCELLANEOUS	4.2%	70	129	54
.27 TRAINING		-0-	2	-0-
.28 VEHICLE OPERATION	13.3%	223	266	84
TOTAL INDIRECT		613	833	74
TOTAL AVAILABLE MANHOUR EFFECTIVENESS		2,289	2,877	80
.31 ANNUAL LEAVE	8.6%	197	133	148
.32 SICK LEAVE*	1.7%	39	188	30
.33 OTHER PAID LEAVE	3.5%	80	-0-	-0-
c. TOTAL INDIRECT LEAVE		316	261	121
D. TOTAL LABOR		2,605	3,138	83



REMARKS

APPROVED BY: _____
(Work Center Supervisor) C. H. Ridgeway

Code 11 - Low effectiveness is the result of the failure to report 332 earned hours. An adjustment will be made in the next report.

Code 22 - 5½ hours were expended waiting for transportation.

Code 26 - Excessive hours required for cleaning equipment were necessitated by heavy rains and muddy working conditions.

Code 31 - High effectiveness is the result of the small amount of annual leave scheduled during this period.

Code 32 - 80 hours sick leave used by an employee who is being retired on a disability retirement resulted in low effectiveness.

Fig. 1. Typical Earned Hour Report. This recap of Engineering Shop performance is "feedback" information vital to program.

HOW KELLY AIR FORCE BASE GETS . . . .

MORE MAINTENANCE PER DOLLAR

PART I. The Civil Engineer Management System

THE BARE STATISTICS are impressive . . . 4000 acres of land, more than 1200 buildings, (one building alone containing 1,102,700 sq ft of hangar and shop area) and a value of buildings and improvements, not including tooling and inventory, of approximately $111,000,000. This is Kelly Air Force Base, and the maintenance of this combination of city and industrial plant is a tremendous job.

Responsible for the maintenance of real estate and property at Kelly is Lt. Co. H. L. Goodman, Civil Engineer. He directs an organization numbering over 1100 people —the Civil Engineering Division, (the Air Force equivalent of a plant engineering department.)

About half of these are shop forces which make up the Maintenance and Repair Branch; the bal-

Fig. 2. These men guide the Civil Engineering Division, Kelly Air Force Base. In uniform, Lt. Col. H. L. Goodman, Chief; to his right, Fred Britz, Deputy Chief.

ance is required for fire protection, aircraft crash rescue, engineering, utilities operation, production control, real estate management, administration and clerical functions, custodial and janitorial services.

Under the capable direction of Mr. Fred Britz, Deputy Civil Engineer, the Civil Engineering Division, with assistance from the Office of the Comptroller at Kelly, has developed management concepts not previously applied to the Air Force Civil Engineer Activities. These techniques, which make up the "Civil Engineer Management System," cover three areas of activity. These are Production Control in the Civil Engineering Division, and Cost Accounting and Work Measurement in the Office of the Comptroller. These areas of activity, their integration, the methods of application and the resulting benefits are the subjects of this series.

Work Measurement

First, the Work Measurement Function. The purpose of work measurement is to develop and maintain engineered labor standards for the manpower required to perform work. The comparison of these labor standards to the actual labor expended provides management with a useful tool . . . one that will readily identify activities in need of management attention and provide information for factual appraisal and evaluation of the status of labor operations. These standards are further used to determine, evaluate and substantiate manpower requirements, develop sound workload scheduling and to maintain balance between workload and resources.

The production of a shop or work center is measured in terms of standard hours. This measurement is obtained by multiplying units of work completed by the applicable standard hour figure, to give a total of direct labor standard hours produced. Standard allowances for indirect labor (supervision, clerical, etc.) are added to this and the total represents the labor expenditure that should have been used to operate the work center. Comparing this total with the actual payroll hours expended by the group in the same period provides a measure of attainment of standard. The relationship between standard or "Earned Hours," as they are called, and actual hours expressed as a percentage is an index of effectiveness. A typical report is shown in Fig. 1.

In summary, the major goals of work measurement are to:

1. Measure labor output against a standard of performance and isolate areas in which improvement is required.

2. Provide a basis for sound long-range planning of shop activity.

3. Improve methods to reduce amount of effort required to perform work.

4. Improve ability to schedule work in the shops.

5. Give the manager a means of knowing what his labor cost should be and in what areas he is experiencing variances from standard.

Cost Accounting

Second, the Cost Accounting System. The primary purpose of this system now undergoing test and development at Kelly is to accumulate and segregate both standard and actual dollar costs for labor, material, and overhead. This provides for development of "price tags" for labor standards, material standards, and overhead standards. Cost Accounting compares the actual costs against the standard costs and indicates the degree of variance for labor performance, material usage, overhead expenditure, and workload volume fluctuation. Cost Accounting identifies resources expended against fiscal fund categories in order to accommodate the preparation and defense of workload budget requirements.

The Cost Accounting System undergoing test at Kelly is more than just an accounting system, because

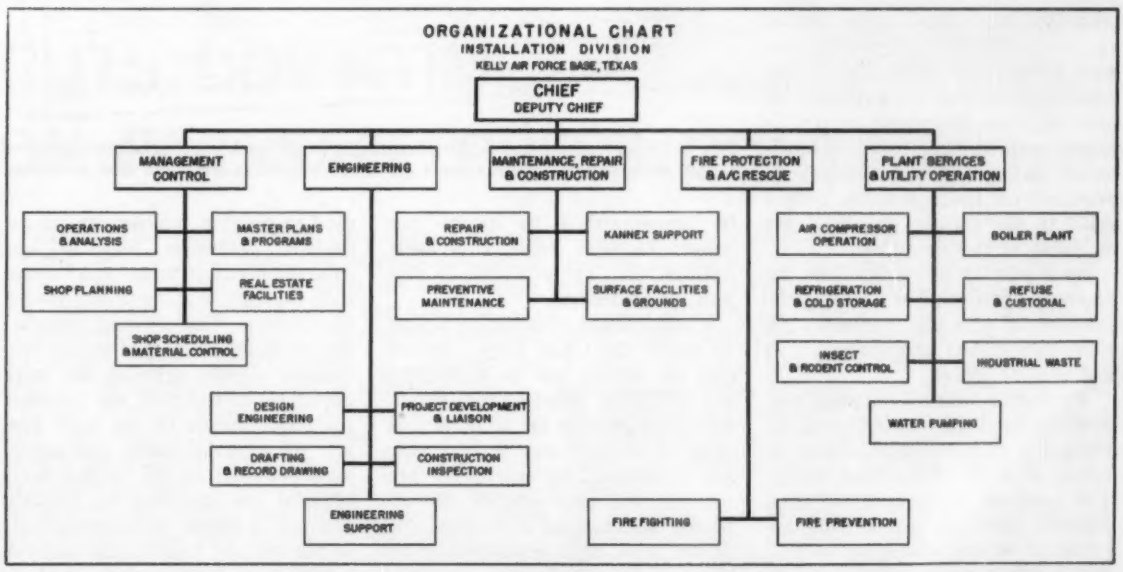


Fig. 3. Organizational chart of Kelly's Civil Engineering Division is graphic indication of wide scope of responsibility.

the Civil Engineer needed more than just an accounting system; he needed cost control and the added feature of cost analysis.

The basic principles of the system are:

1. Planned cost objectives are established as budgets and standard unit costs.

2. Actual costs are then collected and measured against these cost objectives.

3. Deviations from these planned costs (which are called variances) are segregated, summarized by responsible units and elements of costs, and highlighted on a report which is called the Operating Cost Report. This report is issued to each level of management.

Production Control

To the third area of activity, the Production Control function, accrues the responsibility of applying standard data to the various activities of the Civil Engineering Division in such a manner that the results can be accumulated for analysis.

The purpose of Production Control is to plan, schedule, report and control the application of manpower, materials and facilities to the accomplishment of given workload requirements. This is accomplished by planning the workload to the maximum extent possible prior to entering production and by the application of pre-determined labor standards and material estimates for the purpose of determining resources required to accomplish the work. It is further accomplished by insuring that inventory control is maintained; so that the correct materials in sufficient quantities are provided on time, and the proper skills in the proper quantities are available at the right time.

As a starting point, consider the planning phase. The managerial function of planning embraces the visualization and determination of a course of action.

Production control planning personnel have the responsibility to develop the material requirements to satisfy all needs of the work forces. The accuracy and integrity of these material standards are of vital importance in the procuring, storing and timely issuance of material to support workloads. Planning must

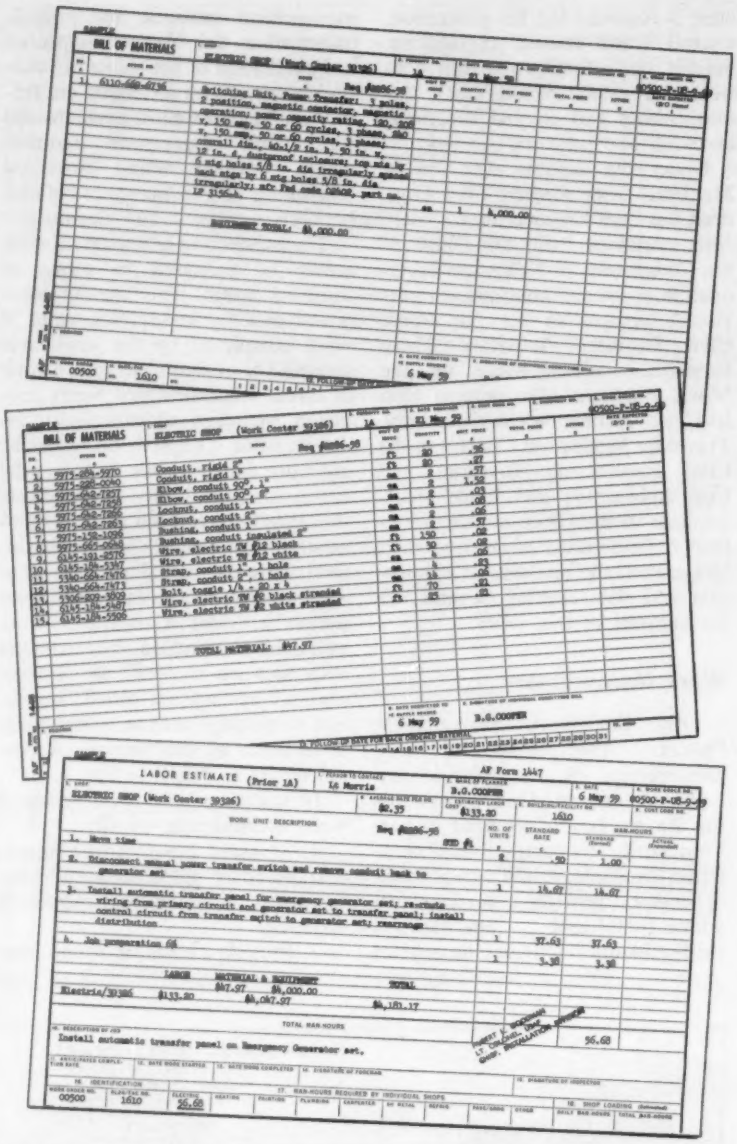
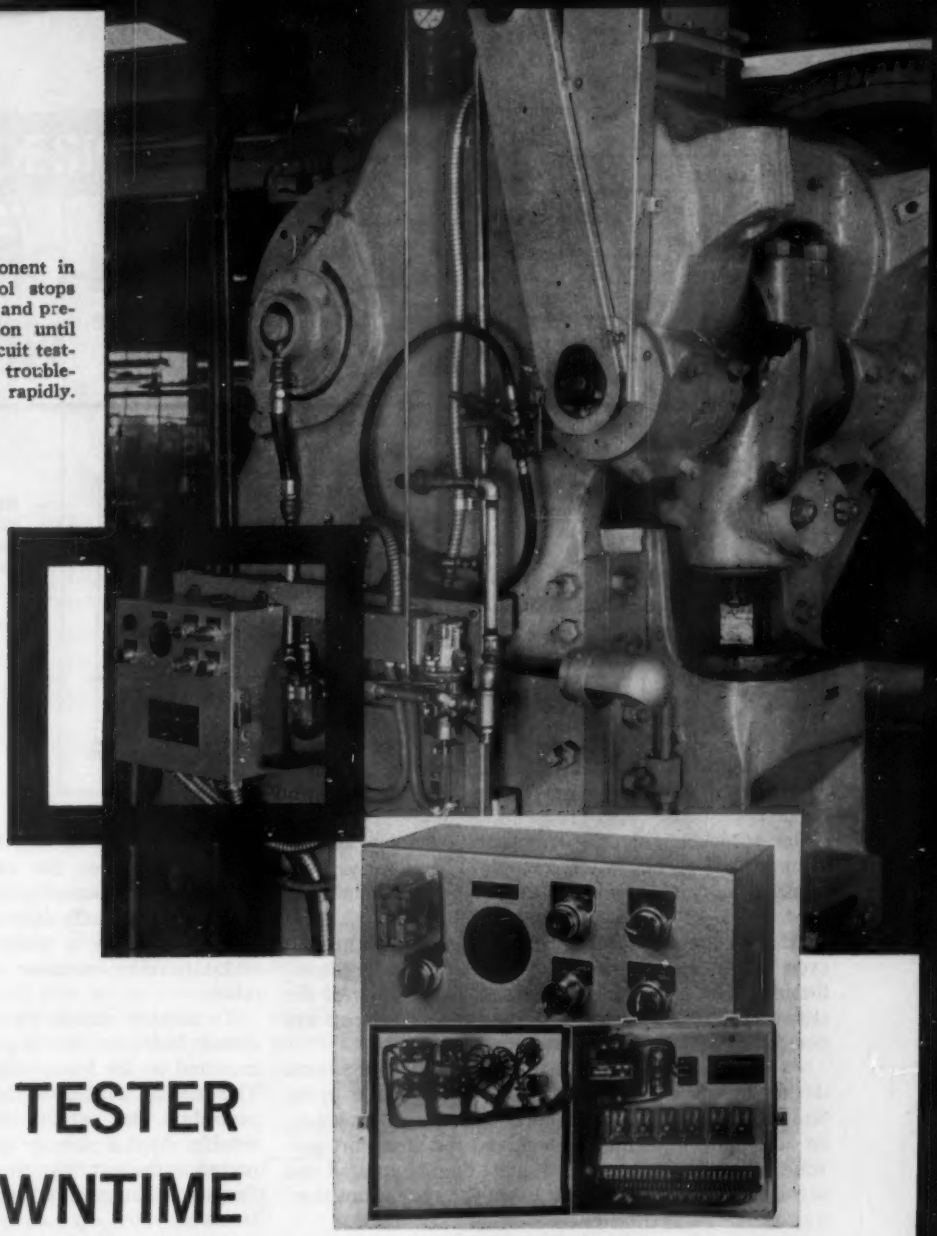

BILL OF MATERIALS
ELECTRIC SHOP (Work Center 39386)
LABOR ESTIMATE (Prior 1A)
AF Form 1447
Install automatic transfer panel on Emergency Generator set.

Fig. 4. These forms, prepared by planners for each work order scheduled into the shops, show material requirements (by stock numbers) and labor cost estimates.

be accomplished to insure that proper facilities, tools, equipment, utilities, etc., are available to support the workload.

Completeness of planning is vital, to assure the Chief Civil Engineer that all actions are in accordance with existing policies and regulations and provide an accurate estimate of project cost. Project costs are determined by computing precise material requirements and applying the standard man-hour costs to the work units developed by the planner. In addition to providing project costs, these data are also used to develop realistic budget estimates, determine material and equipment requirements and furnish shop loading and work scheduling information. The detailed, step-by-step planning developed by the production planner provides the work center supervisor with the complete job requirements for his work center. All material, parts, and equipment required on the project being planned are specified by stocklist number to insure their planned use in the job and to assist the material expeditor in the procurement of the

(Continued on page 244)



Failure of any component in compact press control stops press at top of stroke and prevents further operation until corrected. Built-in circuit testing equipment helps troubleshooter locate faults rapidly.

BUILT-IN TESTER CUTS DOWNTIME ON FAIL-SAFE PRESS CONTROL

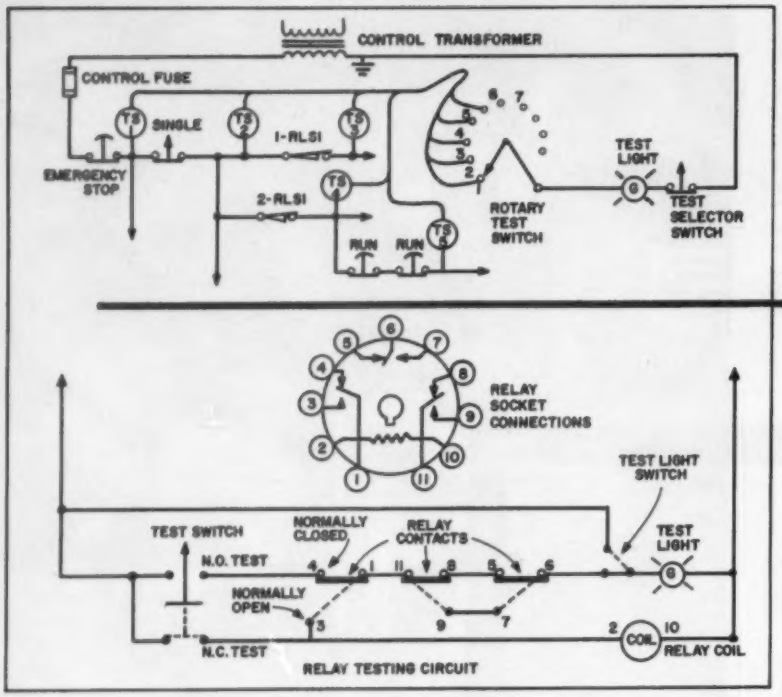
CONVENTIONAL anti-repeat press control systems use one anti-repeat relay, one solenoid valve relay, one pilot operated solenoid air valve and one rotating cam limit switch having two or more contacts. The failure of any of these components under certain conditions can cause a repeat operation, with the possibility of injury to the operator or damage to expensive dies.

Variations of this system may use two solenoid valve relays operating with coils in parallel and with their contacts connected in series. Another variation employs two solenoid valves, in series in the air line, to detect a malfunction. Still another variation employs pushbutton and limit switch contacts on both sides of the line.

While these variations do offer greater safety it is only a matter of degree and does not represent a major improvement in press control reliability. None of these systems provide anti-repeat protection against failure of any one of all the components in the system.

Two Cleveland engineers close to this problem of press safety and reliability decided to do something about it. They are Edward Andrus, Research Assistant, Fawick Airflex Division, Fawick Corporation and George M. Coon, President of Textrol, Inc., designers and builders of control panels. Rightly so, the new control system is known as the "Andrus-Coon Press Control".

This system does provide positive protection against failure of any of the system components. It also protects against repeat operations caused by breakage of the chain driving the limit switch or loss of the limit



Rotary test switch is permanently connected to circuit, duplicates logical point-by-point test procedure used by maintenance man.

Relay test circuit checks coil continuity and functioning of normally open and normally closed contacts in less than 30 seconds.

switch sprocket. This is accomplished by a dual system of control. Two air valves, two anti-repeat relays, two solenoid air valves and two sets of limit switches are used.

Circuits are established, either before or during the cycle, so that two entirely independent systems are functioning at the time the automatic stop at the top of the stroke is required. These two independent systems are completely isolated from each other.

A system of monitoring is provided whereby each device in the system is checked during each cycle. Should any device fail to complete its normal function, an automatic stop will be made and the next start prevented. The faulty component must then be located and repaired or replaced in order to get the system functioning again.

As a press stoppage due to a component failure requires the services of the maintenance man to restore operation, every effort has been made to help him locate the trouble rapidly. A test light, rotary test switch and relay tester are permanently mounted on the front of the control panel.

Troubleshooting circuits

Six plug-in relays are used in the circuit and a socket is provided on the front cover to test these relays. This socket is wired so that in one test position, all the normally closed contacts are connected in series with the test light. If they are properly closed, the test light will indicate this fact. A relay test selector switch is then moved to the opposite position to energize the coil of the relay under test. The normally open contacts will close if the coil operates properly and these contacts complete a series circuit to the test light. By plugging in the relay and turning the relay test switch to one position and then the other, the maintenance man can test all the normally closed contacts, the relay coil and all the normally open contacts in less than 30 seconds. Each relay is tested in turn and any indication of faulty relay operation is remedied by replacing the relay.

To assist in rapidly locating defective components or circuit faults, a twenty position rotary test switch is mounted on the front panel and wired into the circuit. This switch duplicates the logical point-by-point test procedure that would be employed to analyze the trouble. As it is already wired into the circuit and connected to the test light, the maintenance man can rotate the switch to each position and rapidly pinpoint the trouble.

As an example, test position No. 1 is connected into the circuit on the load side of the emergency stop pushbutton. When the maintenance man turns the test switch to this position and the light indicates proper operation, he knows that the control fuse is good and that the emergency stop pushbutton is closed as it should be. Failure of the test light to indicate on this test point would lead to a check of the control fuse or proper operation of the emergency stop pushbutton. The test light itself has a push-to-test socket and proper operation of the test light is assured before beginning the test.

With the crankshaft at the top of its stroke, 11 circuit tests can be made in rapid sequence. The next three tests are made with the "run" pushbuttons depressed. The press is inched around to 270 degrees and two more tests are made to prove the limit switch contacts. A two-position selector switch is provided to separately check each of the two solenoid air valves. Positions 17 and 18 on the rotary test switch are used with this selector switch to check the solenoid air valves. **End**

HOW TO DESIGN

PNEUMATIC-HYDRAULIC ACTUATION SYSTEMS

SECOND IN A SERIES OF ARTICLES

Part II. Designing a pneumatic system for feed approach and rapid retraction

IN PRACTICALLY every plant there are applications that call for equipment that will: 1. feed a tool into a "workpiece" and then 2. rapidly retract the "tool."

In the above statement the reader should not take the term "feed" too literally and thus try to substitute pneumatic systems for hydraulic systems in order to reduce costs. Where critical feeds are involved, pneumatic systems have their limitations.

There are, however, many instances where pneumatics or a combination of pneumatics and a closed hydraulic system will perform very satisfactorily. A good example of this would be the ejection of a workpiece from a conveyor as shown in Fig. 1. This could have several uses in which the package, box, or part is the "workpiece" and the ejection device on the end of the piston rod is the "tool".

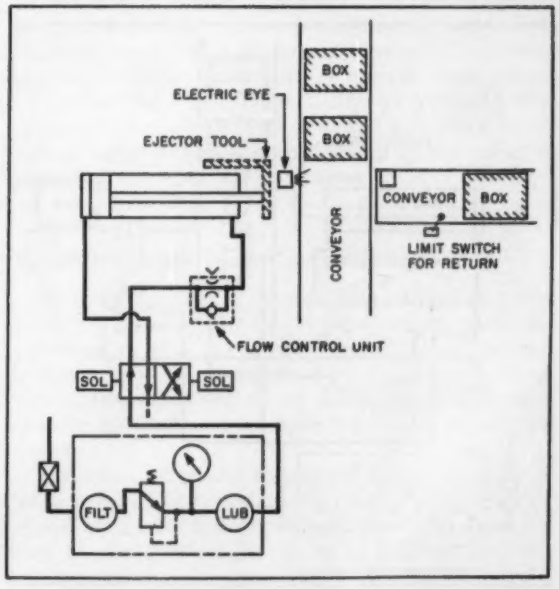
Control valves may be actuated by a number of devices such as an electric-eye, a limit switch, a gaging device or any equipment which could cause an electrical impulse. For example, a box, supposedly sealed, is moving down a conveyor but for some reason one of the flaps is sticking up. As it passes a certain point the protruding flap breaks the beam of the electric eye. This energizes the solenoid valve which in turn directs the air to the blind end of the cylinder. Then, the piston moves forward causing the ejection device to move the box to a rejection point or to a conveyor that causes the box to be returned to the starting point.

When planning such installations it must be remembered that the speed of the air cylinder piston must be controlled otherwise it might cause damage to the workpiece. The return of the piston should be rapid so that the system is quickly made ready for the next workpiece.

Figure 1 shows that the flow control device should always be located between the rod-end port of the cylinder and the four-way control valve when it is desirable to control the outstroke of the cylinder.

Some of the things which the plant engineering group should check are: First, that the flow control is not placed backwards in the line. (There are generally two arrows on the valve, one showing the direction of the

Fig. 1. Device used to eject a package from a conveyor line.



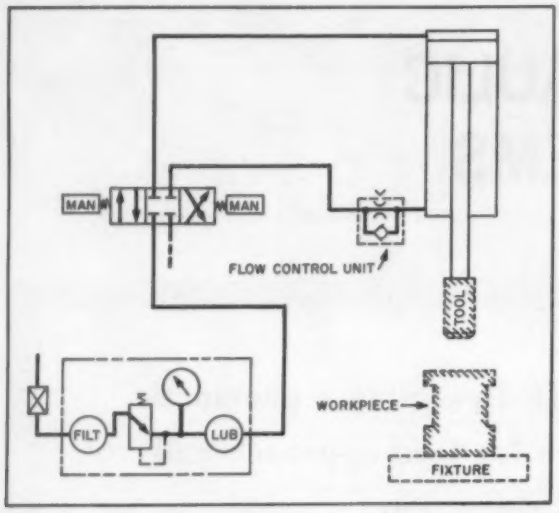


Fig. 2. This circuit has many plant applications. See text.

controlled flow. Many service calls result from placing the valve incorrectly.)

Second, that the control needle is properly set. Don't screw it all the way in unless you desire a very slow feed or no feed at all. Many flow control valves are designed so that if the needle is bottomed the air passage will be completely shut off.

In designing a circuit, it is not advisable to use a flow control in the exhaust of the four-way valve. In the first place it would cause flow control in both directions of the cylinder piston, and second, it will cause some designs of four-way control valves to malfunction. This is especially true of some solenoid-operated, or spring-actuated valves in which the back pressure on the stem seals will create considerable friction. This friction cannot be overcome by the actuators.

Placing the flow control in the pressure side of the cylinder (between the valve and the blind cover of the cylinder) when the outstroke is to be controlled usually does not work satisfactorily in a pneumatic system. It causes a "jumpy" action of the cylinder piston.

The circuit shown in Fig. 1 has many other conveyor applications in the form of transferring the workpiece, raising the conveyor, switching the conveyor track.

Circuit, Fig. 2, has a number of applications in almost any plant. Such applications are: burnishing operations, an assembly of two parts, drilling or reaming applications. In this circuit, the operator can vary the speed of the cylinder piston by changing the setting of the flow control orifice and may stop the piston at any place in its travel. This will facilitate visual inspection at any time. The operator also may achieve infinite pressure control by adjusting the setting of the regulating valve.

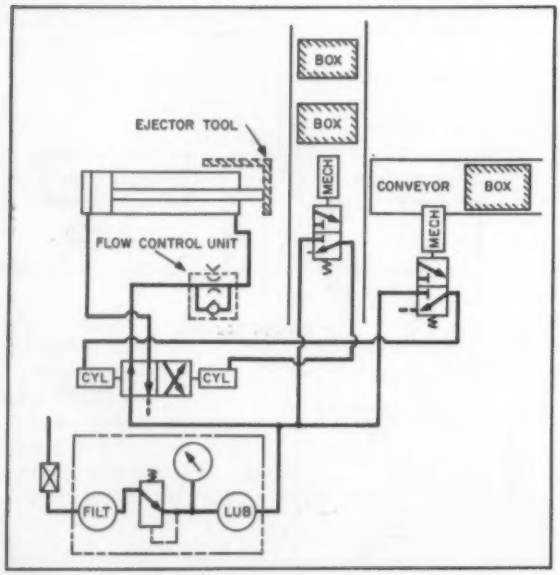


Fig. 3. Pressure-pilot circuit will do same jobs as Fig. 1.

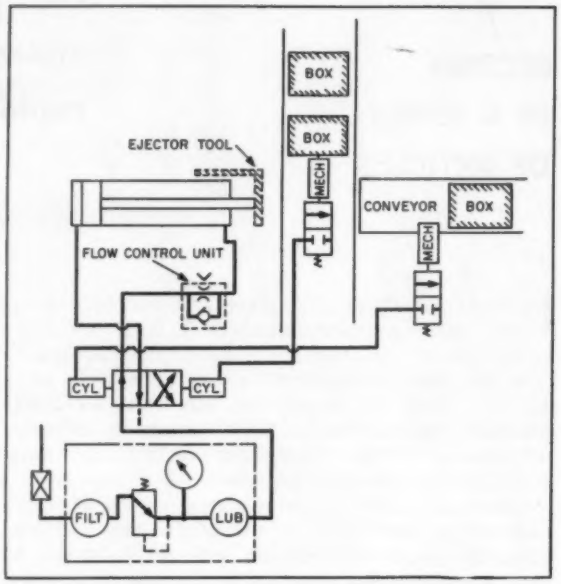


Fig. 4. Bleeder-pilot system will do same jobs as Fig. 1.

There are instances where it is advantageous to eliminate electric controls and use pilot controls. Such instances may occur in highly explosive atmospheres, excessive moisture, and extreme heat. While there are electric controls suitable for explosive atmospheres the cost is considerable higher than those for general purposes. For example a three-way control valve with an explosion-proof solenoid sells for approximately $75.00. The same type of valve with a general purpose solenoid sells for approximately $48.00.

Two types of controls are available for remote control, the pressure-actuated type and the bleeder-actuated type. The pressure-actuated type is believed more positive in action.

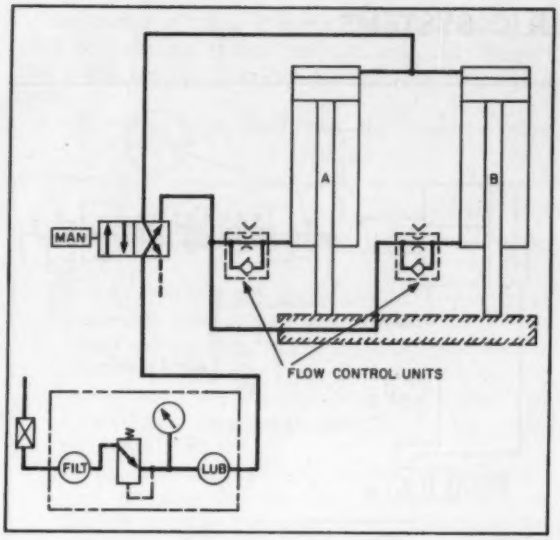


Fig. 5. These flow controls almost achieve synchronization.

Disadvantage in using pilot controls is that considerably more tubing and fittings are required to pipe up a system. The electric wiring as used with solenoid-actuated controls is cheaper than the tubing and fittings.

Figure 3 shows a pressure-pilot-actuated control system and Fig. 4 shows a bleeder-pilot-actuated system. Both of these will do the same job as the system shown in Fig. 1. Note layout difference between Figs. 3 and 4.

There are often requirements calling for the movement of two cylinder pistons in synchronization. In a pneumatic system this becomes rather difficult. On the surface it appears that if one has two cylinders of the same bore and stroke, and a volume of air is released to each cylinder at the same time, the pistons should move at the same speed. This is not true.

Fig. 6. Circuitry designed to move two cylinders in unison.

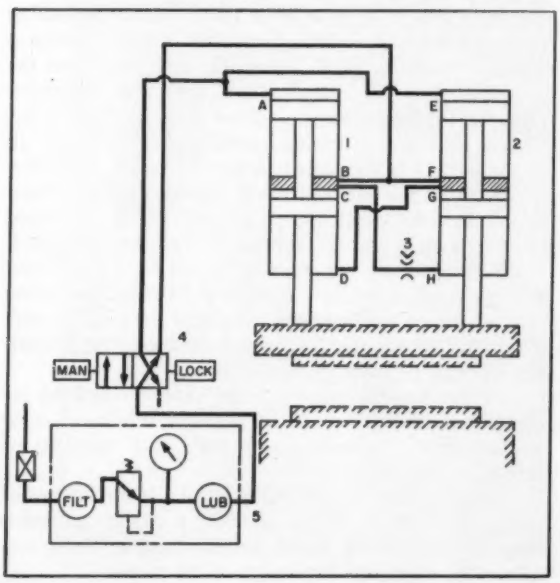


Table I. Correct cylinder sizes for obtaining controlled feed.

Cylinder Bore Inches	Air Pressure psi	Minimum Feed, inches per minute	Maximum Feed, inches per minute
3	50	1.5	222.0
	60	2.5	240.0
	70	3.6	260.0
4½	50	1.0	109.0
	60	1.5	120.0
	70	1.53	150.0
	75	1.6	152.0
6	50	0.6	85.7
	60	1.02	92.0
	70	1.2	109.0
	75	1.35	110.0
8	50	0.33	92.0
	60	0.38	100.0
	70	0.49	109.0
	75	61.0	120.0

Maximum Rapid Return Speed.....600 in. per minute

One cylinder piston may encounter considerably more friction due to the finish in the bore, the fit of the piston and rod packing, and the finish of the piston rod. Figure 5 shows how flow controls are used to approach, but not achieve, synchronization. If the resistance on the end of rod A is greater than that on rod B this will also tend to defeat synchronization.

By adding closed hydraulic systems to two air cylinders, the user can provide synchronization and flow control for his cylinders. In Fig. 6, the application requires two cylinders to move in unison so as to perform an operation upon the workpiece. The operator actuates the pedal of the four-way foot-actuated valve 4 and air pressure is directed to port A of cylinder 1 and to port E of cylinder 2 and is discharged from port D of cylinder 1. Oil moves from port H through flow control valve 3 to port C of cylinder 1. The oil from port D of cylinder 1 flows to port G of cylinder 2. Both piston rods advance in unison at the rate set by the orifice in valve 3.

Synchronization from Closed System

By using this type of system, unequal loading of the rams has no effect on the synchronization since displacement of oil is the governing factor. More than two cylinders may be synchronized by the above method. This system works well where it is necessary to place a cylinder on each of four corners in order to raise an object.

The orifice of valve 3 may be set so that the speed of the piston may be varied from a fraction of an inch per minute to several feet per minute depending upon the bore of the cylinder, the operating pressure, and the volume of the oil chamber. The bore of the oil cylinder

need not be the same as that of the air cylinder but it must have at least the same stroke.

Where the controlled feed stroke must be rather fast, the oil cylinder should be of a smaller bore than the air cylinder, and where the controlled feed stroke must be a small fraction of an inch per minute, the oil cylinder should have a larger bore than the air cylinder.

One manufacturer of the combination air-oil cylinder makes recommendations, as shown in Table I, in order to give the user the desired controlled feed.

To return to Fig. 6, when the work has been completed the operator shifts pedal of valve 4 directing air pressure to port B of cylinder 1 and to port F of cylinder 2. Oil flows from port C of cylinder 1 and from port G of cylinder 2. Oil from port C passes through the free flow passage (check valve) of valve 3 allowing the oil to pass unrestricted to port H. Both cylinders retract in unison thus completing the cycle.

While the operation pressure of a pneumatic system as used in industry rarely exceeds 150 psi and usually is somewhere between 80 and 100 psi, there are times when higher pressures are desired. Here is where the air-actuated intensifier proves valuable. Such devices find use on tube or pipe testing, forcing operations, punching, etc.

Figure 7 shows a basic circuit often used for expanding tubing. This circuit may also be designed with interlocks so that the operator need actuate only one control. However, the added expense for such a setup may not be warranted. In the basic circuit, the operator loads the tube onto the fixture with the fins in place and locks the tube in position. He then pushes the control button which energizes solenoid of Valve D and water passes from inlet to outlet port and on through check valve F to line between intensifier B and fixture.

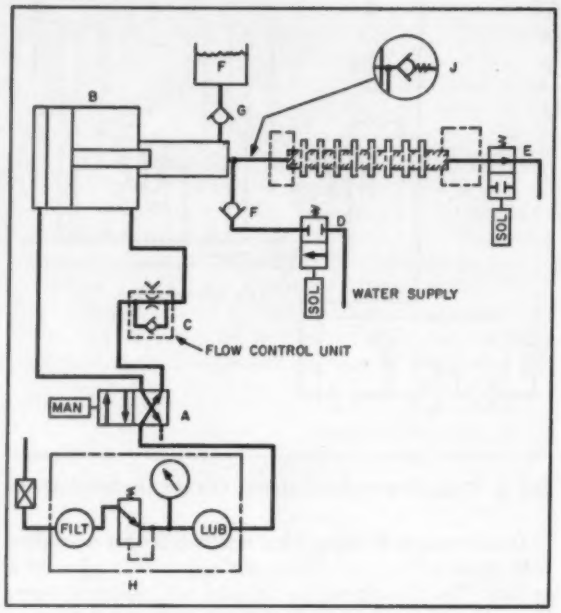


Fig. 7. Basic circuit often used when expanding tubing.

What Happens Inside the Circuit?

When water begins to run freely through valve E, operator actuates handle of valve E which causes the inlet to be closed. Operator then de-energizes solenoid of valve D and water flow is stopped. Next, he actuates valve A thus directing air pressure to blind end of cylinder B and piston starts forward at a speed controlled by flow control valve C.

As piston of B moves forward intensification is set up in intensifier chamber in direct proportion to the ratio between the air cylinder piston area and the intensifier ram nose area. Pressures may be intensified at 10 to 1, 20 to 1 or 50 to 1.

For example if the air cylinder had a piston with an area of 50 sq in. and the intensifier ram nose an area of 1 sq. in., and the air piston is operated at 100 psi then the theoretical operating pressure of the intensifier would be 5000 psi. Of course, there would be some reduction in pressure due to friction caused by the packings. The volume to be emitted by the intensifier is equal to the area of the ram nose multiplide by the stroke of the intensifier.

When the tube has been expanded, operator then actuates valve A in order to return it to its original position. Air pressure is directed to rod end of intensifier cylinder B and piston starts to retract. He also actuates valve E allowing water to drain from the tube. He is now ready to release the tube from the fixture and complete the cycle. In this circuit the amount of pressure can be controlled by adjusting the regulation valve in the panel unit H. This allows the operator to compensate for various wall thicknesses of tubing and also for different materials.

The prefill arrangement consisting of check valve G and reservoir F may or may not be used depending upon the application. The purpose of this is to cause a flow by gravity to fill the intensifier chamber when the intensifier ram is retracted. If the prefill arrangement is used and the intensifier is mounted horizontally, it is desirable to install a spring-loaded check valve (5 lb spring usually is adequate) in the end of the intensifier so the fluid will not drain out during loading. Make certain that the check is free to open under the spring pressure as it leaves the intensifier as shown in circle J.

When using an intensifier it should be remembered that the work must be accomplished before the piston reaches the end of its stroke otherwise the pressure will drop off. It is possible to design a double acting intensifier but it is quite expensive.

Leakage between the intensifier chamber and the air cylinder must be kept at an absolute minimum since you are generally dealing with only small amounts of intensified fluids.

The controlled flow on the outstroke of the intensifier is important. It gives the operator a chance to watch what is taking place during the operating cycle. It also allows for a gradual expansion of the metal.

The choice of valve E is important inasmuch as it must be leakproof at high pressures and must be such that it will not accidentally actuate during the pressure cycle.

Look around your plant, note the instances where you could use an air circuit which provides feed approach and rapid retraction in order to help you increase your production.

In the next article we will cover "fast approach, feed work cycle and rapid retraction." **End Part Two.**

How One Plant Engineer Used Pneumatic Circuits

A CHANGEOVER from manual operation to pneumatic operation of small oven doors doesn't sound too exciting, and it isn't. But just such a redesign job permitted one plant engineer to save money for his company, boost production and considerably improve at least one worker's attitude toward his job.

Air cylinders, as shown in the photo Fig. 1, were mounted directly over the center of each door in order to eliminate any side thrust on the piston rod. Since it was possible to subject the end of the piston rod to several hundred degrees temperature, high temperature packing was installed in the stuffing box of the front cylinder cover.

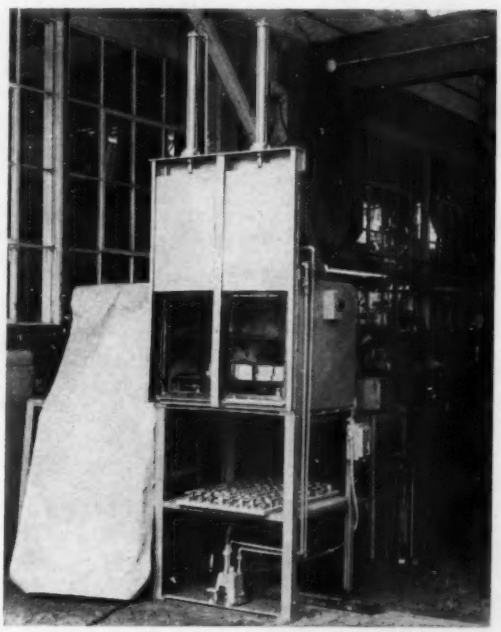
Figure 2 shows the pneumatic circuitry used in the door control. The operator first steps on the foot pedal which, in turn, actuates the four-way control valve B. This directs air pressure through the check valve of flow control valve C and on through opened shut-off valves E and F to the rod end of cylinders J and K.

Air pressure on the rod end of the cylinders causes their pistons to retract at a speed set by flow control valve D and the furnace doors are opened. The four-way, foot-actuated valve is of the latching type which needs only momentary depression of the pedal to cause latching mechanism to actuate. Therefore, the operator can use the tongs to insert or remove the workpiece as soon as the doors have been raised high enough. He has no need to fear that the doors will drop until he is ready to drop them since there is constant pressure on the cylinders.

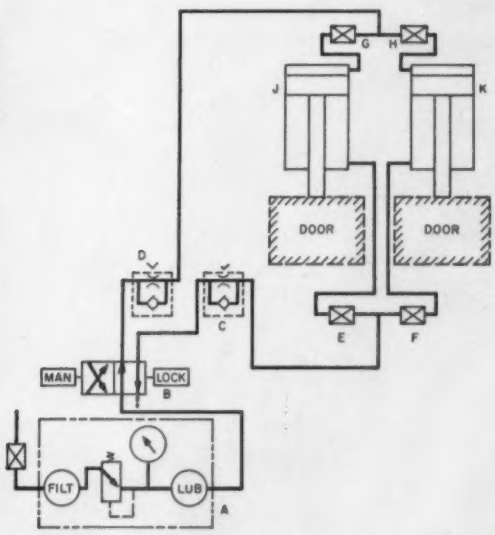
When the furnace is loaded or unloaded the operator again depresses the pedal of valve B and the spool returns to its original position directing air pressure through the check valve of valve D and through shutoff valves G and H on to the blind ends of cylinders J and K thus causing the pistons to descend at a speed set by the orifice in valve C and the furnace doors are closed.

If the operator wants to make use of but one half of the furnace, or if he wants to keep one batch of workpieces heated for a longer period than the other batch, he can close valves G and E or H and F depending upon which side of the furnace he wishes to use. This will save considerably on heat losses.

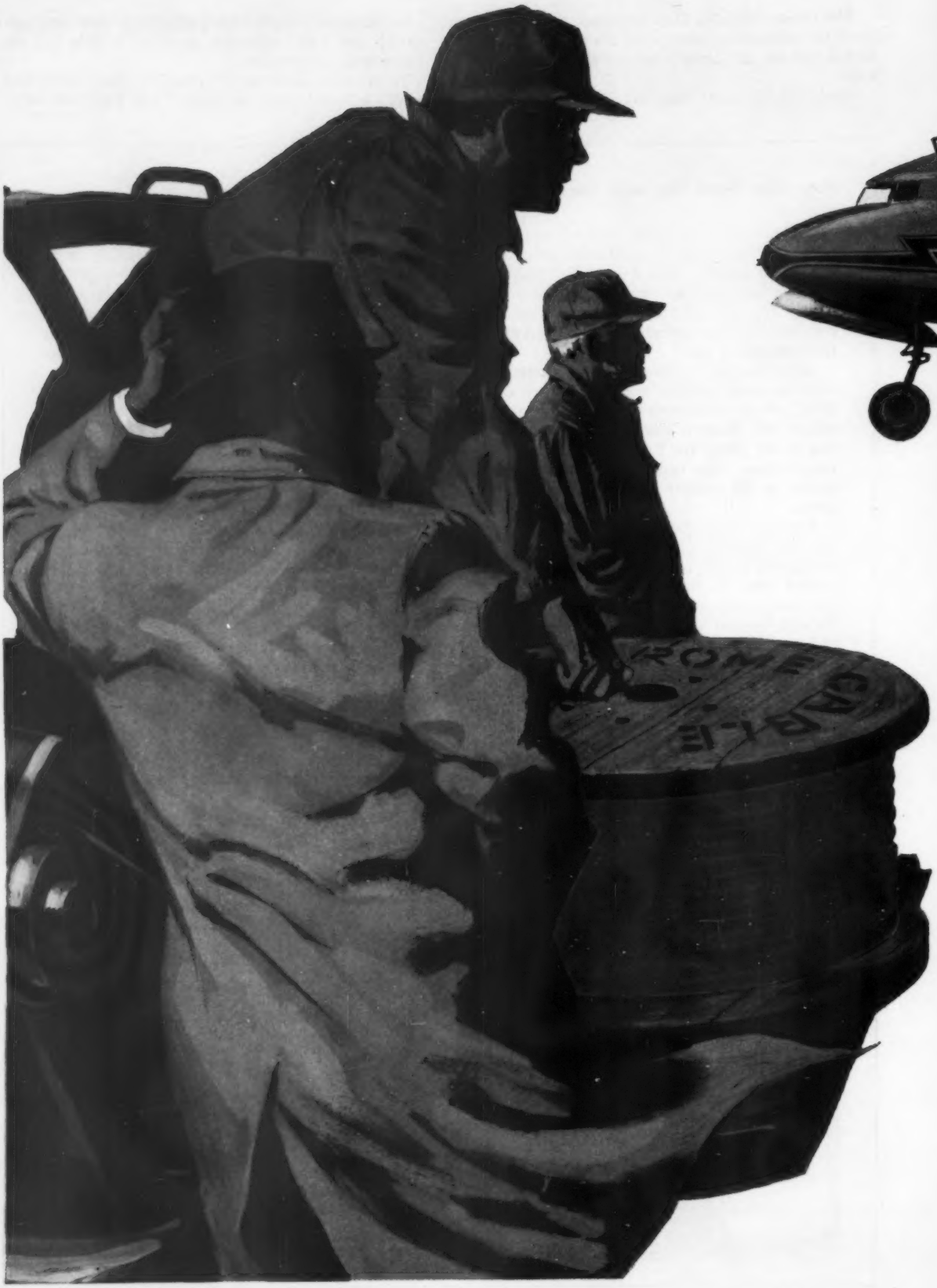
By using the air system the operator protects himself against burns which he often encountered by opening and closing the doors by hand.



Furnace redesigned for operating speed and comfort.



Circuit for control and operation of the furnace doors.


ROME
GRAD-13

His customer needed cable fast—
to cover a breakdown. It took a weekend
of teamwork to handle the

Emergency at 5:05!

Friday, 5:05 P.M. The call caught me just as I was leaving the office. One of my customers* in Seattle was in trouble.

I'm Tony Mitrovich—District Sales Manager for Rome Cable in Seattle.

A big piece of equipment had broken down and my customer needed 500 feet of 5-KV cable *fast!* I wasted no time getting Long Distance. The answer lay some 2500 miles away—in Rome, N. Y.

Friday, 8:15 P.M. Rome time. I had the Sales Service Manager at Rome on the line. I caught him at home. As I got the story later, my request triggered a chain reaction of events. Here's how they went.

Friday, 8:30 P.M. The Sales Service Manager at Rome tried to contact the Head of the Shipping Department. No luck. He tried the Traffic Manager at home. He was out bowling in the Friday night league. Only one thing to do . . .

Friday, 9:30 P.M. He located his man at the bowling center; both went back to the plant that same night, located the right cable in stock and got it out.

Friday, 11:00 P.M. Order completed!

Saturday morning, 7:30 A.M. 500 feet of cable was taken to the airport, where it was shipped by air to Seattle.

Monday morning, 7:30 A.M. in Seattle. The necessary cable was on the job.

That's teamwork. That's the kind of support that makes my job a pleasure—and makes lots of friends for me.

And that's the kind of service that helps lots of my customers out of jams—makes them loyal Rome Cable customers.

**Name furnished on request*

MEET THE MAN

WHO'S DEDICATED TO YOUR JOB

YOUR ROME CABLE SALESMAN

This story typifies the service you can rely on from your Rome Cable salesman. He links you directly and quickly with the facilities and engineering skills at Rome—not only during emergencies but also during any special demands of your job. When you have a wire and cable problem of any kind, give him a call.

ROME CABLE

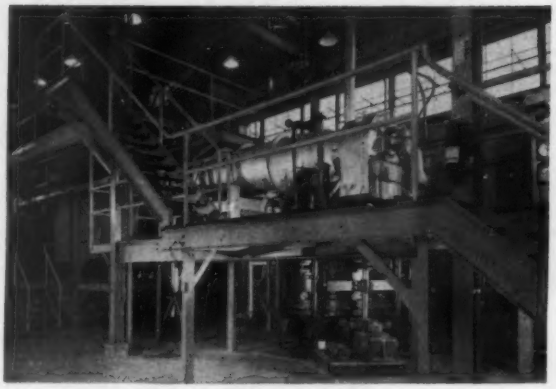
For more facts circle 564 on Reply Card

Process Pilot Plant to Supply Answers on Agglomeration and Heat Treating

ANXIOUSLY AWAITED answers to many problems regarding agglomeration, heat treating and processing of a wide range of raw materials will soon be supplied from Allis-Chalmers new process pilot plant at Carrollville, Wisconsin.

At the heart of the new facility is a completely instrumented model of the double-pass Grate-Kiln system. This facility is able to completely and flexibly duplicate full-scale materials handling; filtering and blending of wet raw materials; feeding of wet or dry raw materials; weighing, product cooling (heat recovery); proportioning of additives; and balling (pelletizing) the materials prior to processing in the combination of traveling chain-type grate and short rotary kiln.

Extensive operational and process information is recorded for examination and interpretation by engineers of both Allis-Chalmers and the company seeking to process a material.



Canned Motor Pumps Get New Twin-Loop Test Facility

ENGINEERS at Westinghouse Electric Corporation's atomic equipment department at Cheswick, Pa. have recently built a new twin-loop test facility for canned motor pumps designed for controlled circulation boiler applications. Fluids at temperatures up to 500 F can be pumped through the new unit that supplements existing high temperature, 2000 psi test loops.

The outstanding feature of this loop is its versatility. With it, Westinghouse engineers can test the full line, up to 22,000 gallons per minute of canned motor pumps without changing the basic configurations of the loop. At the same time pumps with volutes ranging from 12 to 20 in. in diameter can be accommodated. The loop can also be adapted for testing 4160-v pump motors as well as the standard 440-v type.

Connections for volutes of different size are readily changed by the use of bolted flanges. Previously, it was necessary to weld each pump volute into the loop and to make special modifications to the loop before testing of the various pumps.

Another unique feature of this loop is that it is designed for double discharge piping which permits double discharge pump volutes to be tested under actual operating conditions. As a result, testing is now more accurate and complete. One discharge arm of the loop extends from the volute at the bottom of the pump. The other arm is identical, extending from the opposite side of the is directed to the intake side of the volute located under pump. Both arms meet at a "T" connection and the flow the pump.

Metal Sign Baking Is Conveyorized – Results: Dust- and Lint-Free Finishes

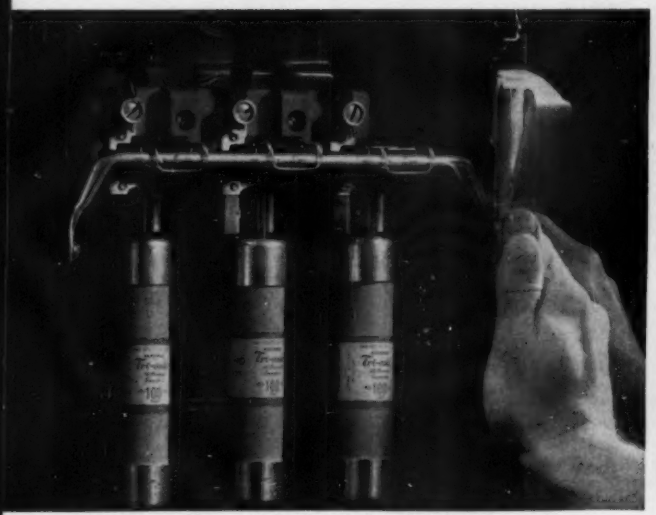
BY USING conveyorized paint baking ovens for their outdoor metal signs, Stout Sign Co., St. Louis, Mo., has eliminated the slow batch baking procedures which were employed formerly. The switchover has also reduced considerable handling and the need for a lot of floor space. The new 172-ft, tunnel-type oven provides a capacity of 75,000 sq ft of paint surface per hour. Oven also provides better adhesion and harder, mar-resistant paint films.

As a result of its installation, the company has accelerated production flow, reduced paint fumes 75 per cent and is providing dust and lint-free finishes.

Engineers of the R. C. Mahon Company's Industrial Equipment Division, Detroit, designed, engineered and manufactured the oven.

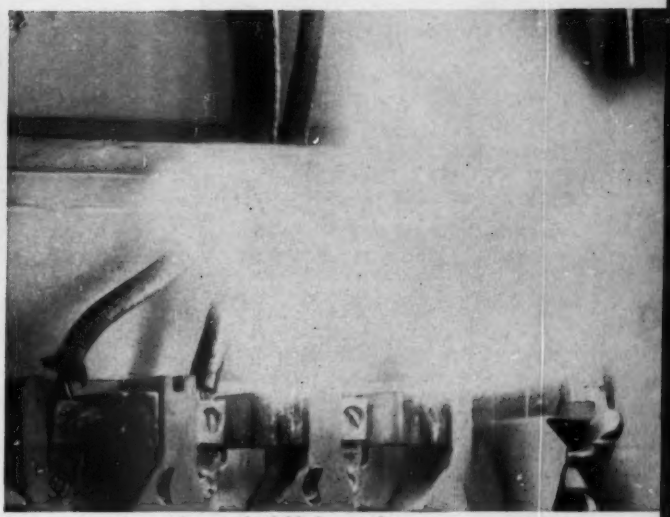
FOR SAFETY'S SAKE, BUY VACU-BREAK

With BullDog's exclusive clamped-pressure switching contacts



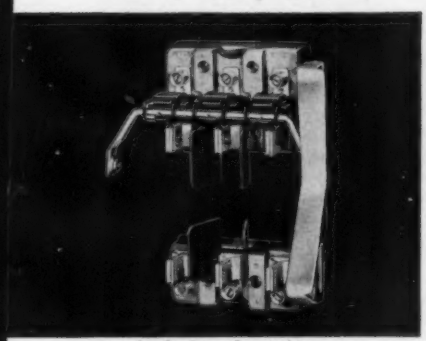
Maximum safety with BullDog Safety Switches

Arcs are smothered before they can cause fire hazard or damage to the switch because contacts are housed inside compact Vacu-Break* chambers. Pitting and burning of contacts are reduced to an absolute minimum—maintenance is virtually eliminated.



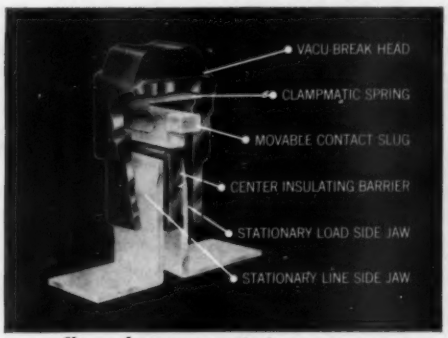
Dangerous arcing with open knifeblade switches

Unconfined flash explosion occurs, burning and pitting blades. Fire hazard and frequent maintenance are the result. These are unretouched photographs of 100 amp, 600 volt switches, operating under 90 ampere, 440 volt load with 40% to 50% power factor.



Simple, foolproof switching

Vacu-Break heads are *directly* connected to the switch handle. No toggles, triggers or springs to fail. No danger of switching failure. Positive, safe switching *every time* for a lifetime.



Clamped-pressure contacts

This close-up shows movable contact slug and Clampmatic* spring assembly inside Vacu-Break chamber. The Clampmatic assembly assures clamped-pressure contacts, speeds "break", increases switch life.

Withstand 100,000 amp fault current

BullDog Vacu-Break Switches—Master and Junior—will withstand 100,000 amp short circuit current when equipped with current-limiting Amp-Traps**. Play it safe—recommend and buy BullDog Vacu-Break!

© BEPCO

*Vacu-Break and Clampmatic are registered trademarks of the I-T-E Circuit Breaker Company. **Amp-Trap is a registered trademark of the Chase-Shawmut Company.

BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY
BOX 177 • DETROIT 32, MICHIGAN

In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

For more facts circle 565 on Reply Card

NEW PLANT CONSTRUCTION —advance information on location, costs

Dierks, Ark.—United States Glass & Chemical Corp., 1955 Fourth St., Tiffin, O., plans to construct a barite and gravel mill on large building site in this city. Barite is a component of the "mud" used when drilling oil. Plant will have an initial capacity of 35,000 tons of barite annually and will cost approximately $500,000.

Morrilton, Ark.—Crestliner, Inc., Little Falls, Minn., plans to construct a 25,000-sq ft manufacturing facility. Work on the new structure will get under way at once and is scheduled for completion by the fall of 1960. Cost of the new building with equipment will be about $600,000.

Carlton, Calif.—Holly Sugar Corporation, 3 S. Tejon Ave., Colorado Springs, Colo., plans to expand company's facility here engaged in the production of beet sugar. Plant's capacity will be increased from 4000 to 6000 tons daily. Plans call for completion of the present expansion in time for the 1961 spring harvest.

Newport Beach, Calif.—Lockheed Aircraft Corp., 2555 North Hollywood Way, Burbank, Calif., plans to construct a headquarters plant for company's electronics and avionics division. Construction is just under way for scheduled completion by late 1960. Contractors on the project are Puget Sound Bridge and Dry Dock Co., Seattle, Wash., a wholly owned subsidiary of Diversified Builders, Inc., Paramount, Calif. Plant will cost $2.5 million.

San Diego, Calif.—Solar Aircraft Company plans to construct an engineering and research center at its headquarters here. New structure will have a floor area of approximately 62,000 sq ft and is scheduled for completion by the early summer of 1960. The building along with necessary equipment will cost in excess of $1 million.

San Francisco, Calif.—J. A. Folger & Company, Howard and Spear Streets, this city, plans to construct a plant for the production of instant coffee in the South San Francisco area. Plans include the construction of a $2-million instant coffee manufacturing plant with necessary equipment. Work will get under way at once for scheduled completion by the fall of 1960.

Van Nuys, Calif.—Marquardt Corp. will begin construction at once on a 60,000-sq ft engineering and administration building for the company's power systems group on its headquarters plant site, here in West Van Nuys. Building is scheduled for completion by early 1961 at a reported cost in excess of $1.2 million.

Deep River, Conn.—Plax Corporation, Hartford, Conn., plans major addition to local plant here engaged in the manufacture of plastic bottle moldings. Size of existing plant will be increased by approximately 40,000 sq ft to a total of 128,000 sq ft. Plant will be completed in the spring of 1960 at a cost of $325,000.

Milford, Conn.—Eversharp, Inc., 1800 W. Roscoe St., Chicago, Ill., will build a large home office and manufacturing building to cost in excess of $2 million. Site of the new plant at the intersection of the Boston Post Road and the Connecticut Thruway is just a few miles from the present Schick plants in Bridgeport, Conn. New building will be completed by the middle of 1960.

Tampa, Fla.—Anheuser-Busch, Inc., 721 Pestalozzi St., St. Louis, Mo., plans major expansion of company's brewery recently opened at Tampa Industrial Park a few months ago. Plans call for a $5-million expansion in production facilities to increase present capacity from 500,000 to 850,000 bbl.

Indianapolis, Ind.—Pitman-Moore Co., a division of Allied Laboratories, Inc., 1200 Madison Ave., plans to construct a plant to be used as a tissue culture center. New facility will include special features based on new requirements of the U. S. Public Health Service and will enable the company to improve its virus research. Work on the new structure, reported to cost approximately $1.5 million, will start at once for completion by the fall of 1960.

Lake Charles, La.—Continental Oil Co., Houston, Texas, will build a petrochemical plant adjacent to company's refinery here for the manufacture of a line of industrial alcohols formerly produced from natural oils and fats. Work on the new facility is already under way and is scheduled for completion by the early part of 1961.

Baltimore, Md.—Carling Brewery Co., Cleveland, O., plans to construct a brewery on local site. New unit will be erected at a cost of $16 million and will begin operations by the spring of 1961. Plant will have an initial capacity of 800,000 bbl of beer annually.

Framingham, Mass.—International Paper Co., Single Service Division, 220 E. 42nd St., New York, N. Y., will build a 50,000 sq ft plant here for the manufacture of milk containers. New plant will be placed in operation early next year and will have a capacity to produce about 35 million paper milk containers a month. Work is already under way on new facility and will represent an investment of $1 million.

North Adams, Mass.—The Sprague Electric Co., 149 Marshall St., this city, plans to erect a laboratory and administration building in the North Adams redevelopment center area. Construction will get under way as soon as preliminary engineering work is concluded. Project is expected to cost about $1.6 million when completed some time in 1961.

Norwood, Mass. — Cornell - Dubilier Electric Corp., 1000 Hamilton Blvd., South Plainfield, N. J., plans to convert a plant it recently obtained into a research and development laboratory. Company plans eventually to consolidate its Cambridge, Mass., complex with the 100,000 sq ft Norwood facility.

Shoreham, Mich.—Continental Can Co., 100 E. 42nd St., New York, N. Y., plans to construct a 250,000-sq ft can manufacturing plant and warehouse. Plant will be equipped to turn out 250 million cans annually. Design of the plant will allow for expansion and will include facilities for lacquer coating and end fabricating. Total cost for plant and equipment will probably exceed $3 million.

Minneapolis, Minn.—Forman-Ford & Company, 11 E. Second St., this city, plans to construct a plant and warehouse in Golden Valley, a suburb of Minneapolis. Work is already under way for scheduled completion in the fall of 1960 and will cost $400,000.

Edison Township, N. J.—Aluminum Company of America, Alcoa Building, Pittsburgh, Pa., plans to construct a 200,000-sq ft die casting plant, which is scheduled for completion late in 1960 at a reported cost of $2 million.

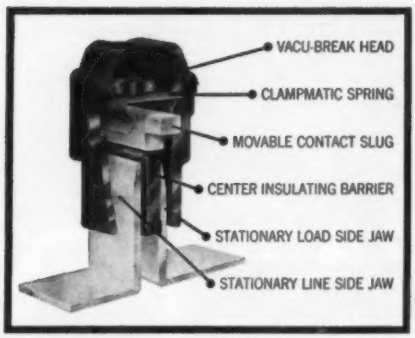
Moorestown, N. J.—Radio Corporation of America, 30 Rockefeller Plaza, New York, N. Y., plans to construct a 100,000-sq ft addition to company's defense plant located here. New addition will be designed to relieve an acute space shortage among the engineering and administrative personnel. Work on the new wing will begin soon and is scheduled for completion in the fall of 1960. Cost may exceed $1 million.

New Brunswick, N. J.—Colgate-Palmolive Company, 85 Hudson Street, Jersey City, N. J., plans to construct a multi-million dollar research center on a 75-acre tract of land adjacent to the Rutgers University Science Campus. The 200,000-sq ft center will be located in River Rd., Piscataway Township. Ground will be broken soon for the two-story building.

Somerville, N. J.—American Vitrified Products Co., National City Bank Bldg., Cleveland, O., plans to construct a completely automated plant on large building site here, at a cost of about $4 million. New plant will make pos-

(Continued on page 248)

Compact central power control—*with Vacu-Break protection*



VACU-BREAK CONTROL snuffs arcs immediately when breaking circuits under load. The enclosed head limits the oxygen available during the brief arcing period. Closeness of the head material causes the arc to cool and extinguish quickly. "Double-break" action reduces the distance the Vacu-Break head must travel before the arc is extinguished. In addition, Clampmatic action assures bolt-tight contacts, accelerates breaks.

BullDog Vacu-Break® Power Panels provide the efficient, economical way to centralize lighting and power distribution. One compact panel controls a host of lights and motors . . . saves space . . . provides real circuit flexibility.

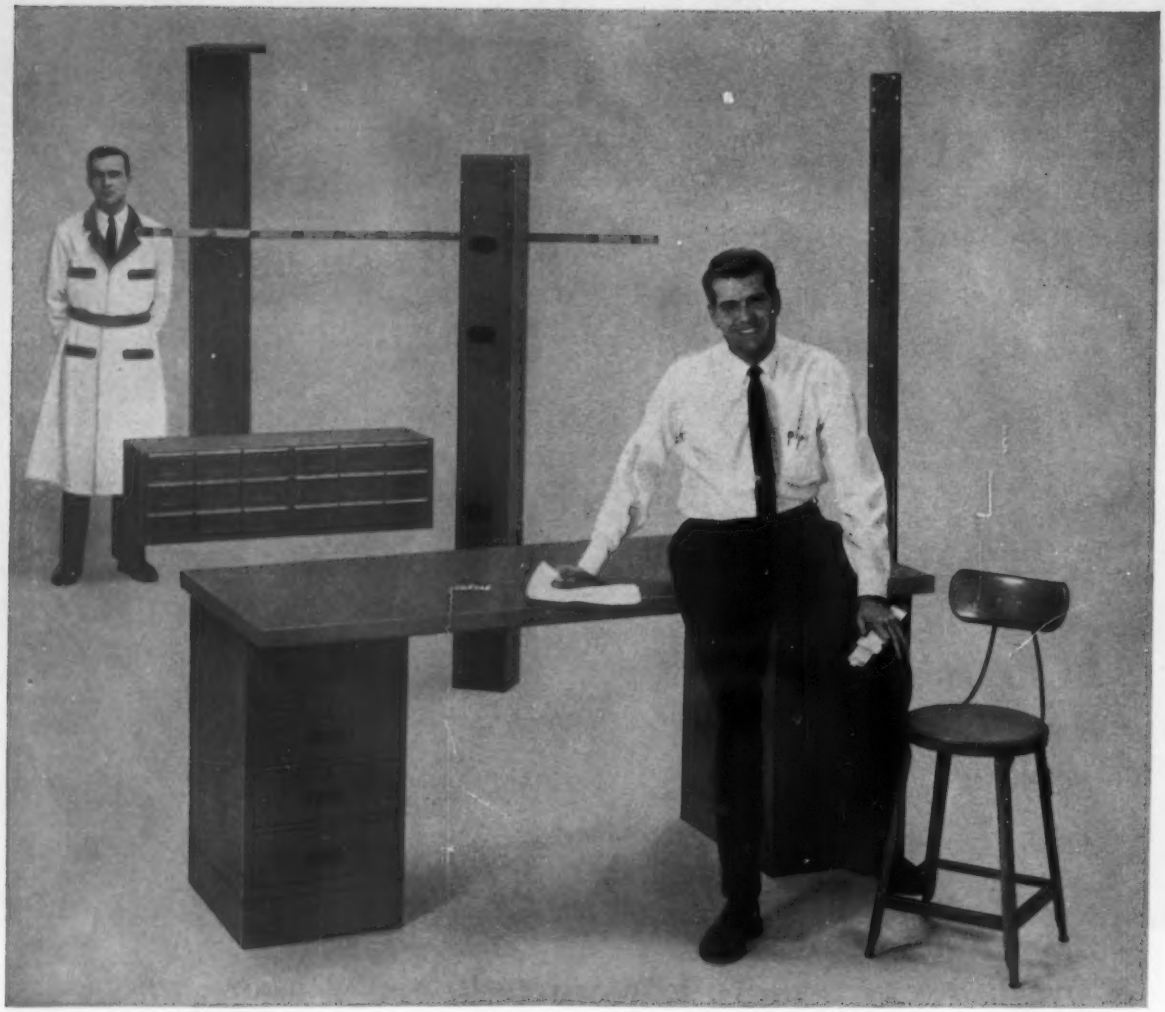
BullDog Power Panels are prefabricated . . . switch units are quick-make, quick-break, standardized and interchangeable. Units are available from 30 to 600 amperes. It is simplicity itself to convert the panels when circuit requirements change.

Exclusive Vacu-Break control snuffs arcs quickly . . . Clampmatic® action assures bolt-tight switching connections—longer equipment life. For safety's sake—and superior performance—specify BullDog Vacu-Break Power Panels.

BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY
BOX 177 • DETROIT 32, MICHIGAN

In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

For more facts circle 566 on Reply Card



The work bench with a thousand ideas

Let's forget how people got along before the Hallowell Unit Work Bench arrived — for here is a bench loaded with personalized ideas for you.

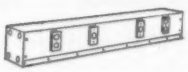
Drawers if you want them, doors if you want them, adjustable shelves, top shelves, Wiremold or electrical panel sections, storage wall units—choice of tops.

You can butt them end to end, join tops midway on cabinet, arrange them back to back, or rearrange them later with ease. It adds up to custom quality and custom adaptability at standard bench prices.

CUSTOM-TAILOR HALLOWELL UNIT WORK BENCHES TO YOUR SPECIFIC NEEDS

Doors or drawers—either or both

Backboard or Top Shelf



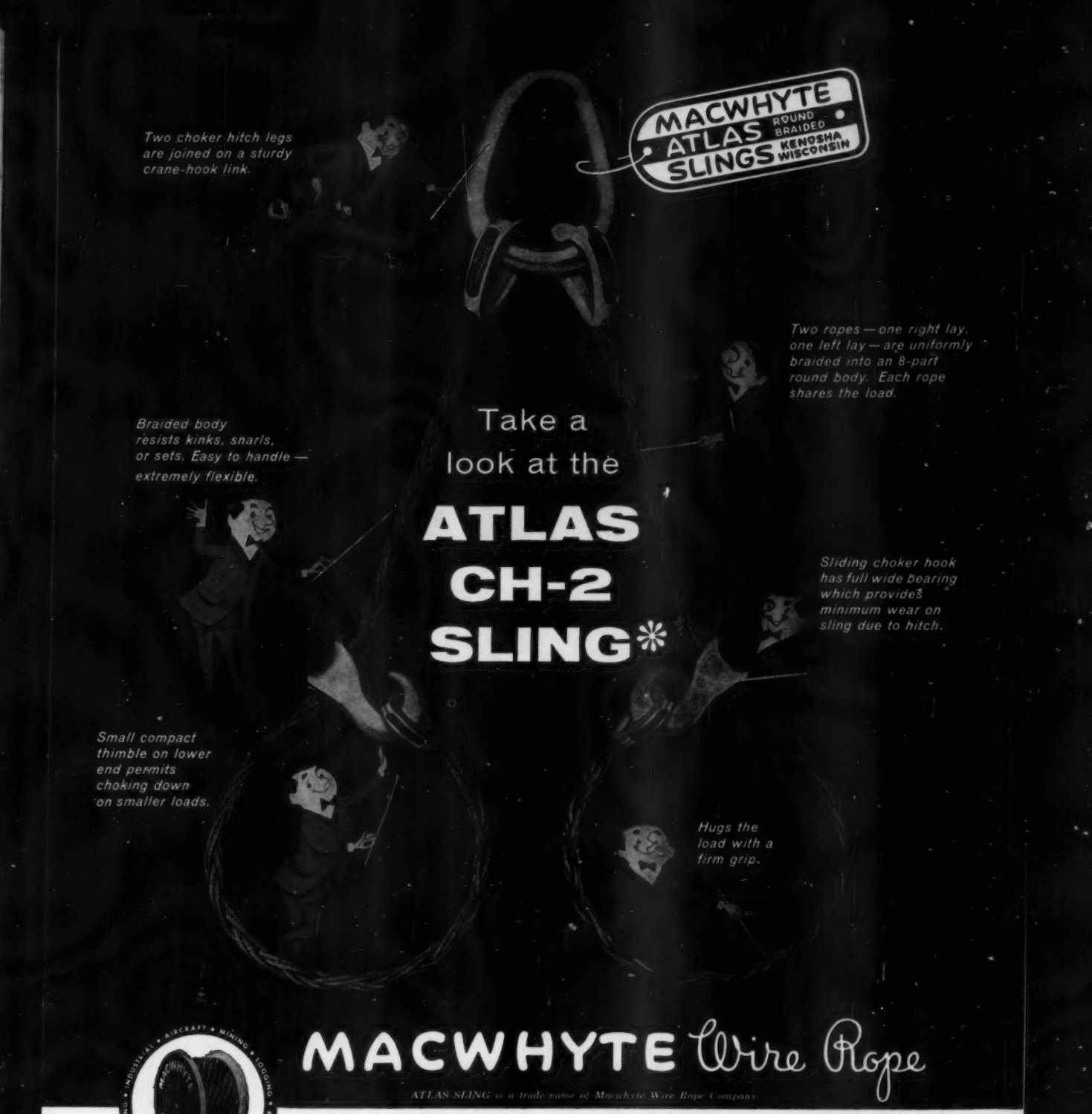
Electrical Panels

. . . or combinations of these and other accessories available from stock.

See your authorized Hallowell Distributor or write direct

COLUMBIA-HALLOWELL Division SPS JENKINTOWN 26, PA. • SPS WESTERN, SANTA ANA, CAL.

For more facts circle 554 on Reply Card


MACWHYTE
ATLAS ROUND BRAIDED
SLINGS KENOSHA WISCONSIN
Two choker hitch legs are joined on a sturdy crane-hook link.
Two ropes — one right lay, one left lay — are uniformly braided into an 8-part round body. Each rope shares the load.
Braided body resists kinks, snarls, or sets. Easy to handle — extremely flexible.
Take a look at the
ATLAS CH-2 SLING*
Sliding choker hook has full wide bearing which provides minimum wear on sling due to hitch.
Small compact thimble on lower end permits choking down on smaller loads.
Hugs the load with a firm grip.

MACWHYTE *Wire Rope*

ATLAS SLING is a trade name of Macwhyte Wire Rope Company

INDUSTRIAL • AIRCRAFT • MINING • LOGGING • ELEVATOR • MARINE • CONSTRUCTION • DRILLING

Macwhyte Atlas braided slings are readily available in a variety of standard types and assemblies. If you have a *special* load-handling requirement, we will make Atlas Slings to your design . . . or Macwhyte engineers will gladly give you their design recommendation. There's a Macwhyte representative close by. Ask for your free copy of sling circulars 5308R and 5886.

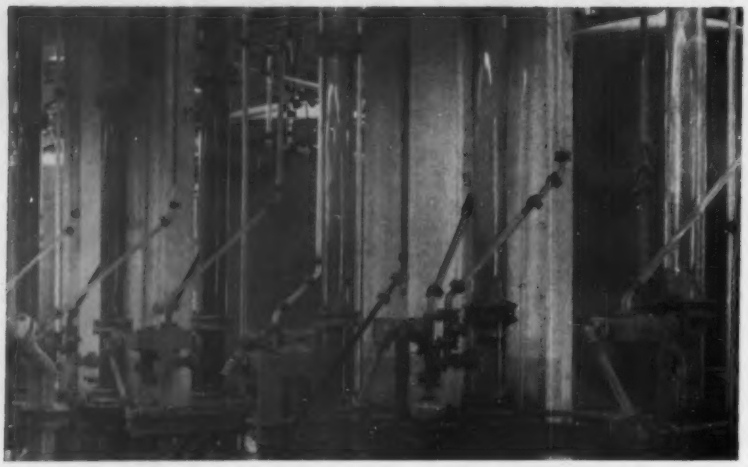
MACWHYTE WIRE ROPE COMPANY

2900 Fourteenth Avenue • Kenosha, Wisconsin

Manufacturers of wire rope, slings, and cable assemblies. Distributed and stocked throughout United States.

For more facts circle 567 on Reply Card

4 WAYS TO USE GLASS IN THE PROCESS INDUSTRIES



1. Zirconium maker uses 6-inch glass columns to get into commercial production. At the Wah Chang Corporation's Albany, Oregon, plant you'll find an extraction system made up of PYREX brand glass columns, 6 inches in diameter and 50 feet high.

Zirconyl chloride enters the open end against a countercurrent stream of thiocyanate-rich methylisobutyl ketone. After hafnium is extracted, a countercurrent hydrochloric acid stream strips out any remaining zirconium in three 6-inch by 50-foot glass columns.

Finally, zirconium-free hafnium raffinate is scrubbed with sulphuric acid in more glass columns–6 inches in diameter and 55 feet tall. The scrubbed solvent then is recycled to the extraction columns and the aqueous solution of hafnium sulfate is neutralized with ammonium hydroxide.

Why PYREX brand glass No. 7740 for this processing? Because this is *the* glass that stands up to corrosive fluids. It is virtually unaffected by most acids or alkalies; there is no side reaction, no pickup. And with PYREX brand glass you have no worries about heat or mechanical shock. If you would like more facts about PYREX brand glass pipe or columns, write for a copy of PE-3.

2. Heat, cool, and condense corrosive fluids in PYREX® modular shell and tube heat exchangers. Your liquid will come in contact only with PYREX brand glass No. 7740, plus a chemically resistant ceramic, and TEFLON. You'll have no worry about build-up cutting efficiency, because glass is smooth. You can design systems to use multiple units, in parallel or series-parallel flow combinations. You have low installation costs, because units are light in weight (the 50 sq. ft. capacity model weighs only 165 pounds). Mounting brackets are supplied. You can choose from models that take corrosives on tube side only, or on both tube and shell sides. Write for the facts today.

3. No more plug-ups in glass waste-lines handling cellulose acetate dope. Problem: Design a drainline system to handle sulfuric acid, acetic acid, and a cellulose acetate effluent. Complication: when "dope" overflows into the lines, water turns the fluid into a solid acetate flake that tends to plug. The solution: 220 feet of PYREX brand pipe. No problem with corrosion. No worry about shock from steam cleaning. And if dope does build up, it's *visible*. You take down only those sections you need, saving a great deal of time and effort. And you discover that the visibility and ease of cleaning of *glass* make it possible to use smaller diameter lines than with metal. The facts are in Bulletin PE-30.

4. NEW PYREX brand Y-valve. Now you can get a Y-valve for handling most fluids without corrosion or contamination. The valve comes in 1½" and 2" sizes–with 1" to be available soon. You get a tight seal, because a spring-loaded plug keeps TEFLON firmly against the seal. You can disassemble without removing the valve from the line. And you get extra strength, because the body is tempered, then armored with FIBERGLAS impregnated with a polyester resin. Use this valve to 50 psi, up to 250° F indoors, 175° F outdoors, with temperature differentials as high as 200° F. New Bulletin PE-4 gives details.

CORNING GLASS WORKS

10 Crystal Street, Corning, N. Y.

CORNING MEANS RESEARCH IN GLASS

For more facts circle 568 on Reply Card

This Is *Your* Advertisement!

REMEMBER OUR recent editorial quoting industry leaders on the function and importance of plant engineers? The response was tremendous. To date we've received hundreds of requests for reprints. And many of these requests came from industry leaders and marketing people.

With proven interest like this, we're convinced we should carry the story of the plant engineer to the public at large!

So beginning with the advertisement on the facing page we're going to run a series of messages in the *New Yorker* magazine.

Each ad will feature a quotation from an industry leader. Each will stress the importance of plant engineers to industry today.

The *New Yorker's* circulation of more than 400,000 includes many important people in industry, finance and marketing. Quite a few college students, too. (Tomorrow's plant engineers). An ideal audience from every standpoint!

We have been fortunate in obtaining the services of Noel Martin, one of America's leading graphic designers to do the series. We believe his striking designs will do much to dramatize the quotations.

If you would like a 17 in. x 22 in. poster-size reproduction of this advertisement for your office or den, just drop us a line. We'll be happy to forward you one free of charge by return mail. Send your requests to the Editor, Plant Engineering, 308 E. James St., Barrington, Ill.

PLANT ENGINEERING *magazine dedicates this series to its readers, the thousands of plant engineers who plan, purchase and maintain America's industrial plants and the equipment and supplies they use.*

"The Plant Engineer is at the source of our problems, conceives the solutions and directs the intricate steps of execution."

Charles H. Williams
Administrative Vice President – Engineering
United States Steel Corporation

NOW!

Westinghouse research announces another major achievement in fluorescent lamp development!

15,000 LUMENS IN A LIGHTWEIGHT, 96-INCH SUPER-HI™ LAMP!

Through new ballast equipment and improvements in lamp design, Westinghouse engineers have increased the light output of an 8-foot S.H.O. Lamp to more than that given by *two* standard Slimline lamps. Even more remarkable, the extra bonus of light you get in these new Super-Hi™ lamps was not achieved at the sacrifice of their light weight. In fact, similarly rated fluorescents weigh about twice as much as the S.H.O.—almost *five tons* more of glass is hanging from the ceiling in a 5000 lamp installation.

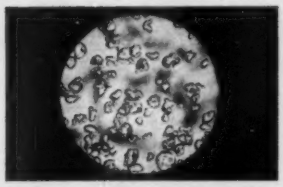
Super-Hi™ lamps deliver their full light output regardless of their position in fixtures. They have a smooth, tubular surface, free from dust-catching pockets or indentations which quickly cut down the light. S.H.O.'s are rated at 7500 hours life. List price, $6.95.

YOU CAN BE SURE... IF IT'S

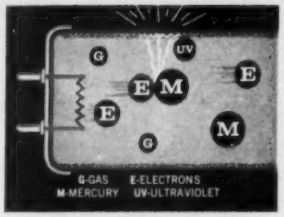
Only Westinghouse brings you these

6 LIGHT-BOOSTING ADVANCES

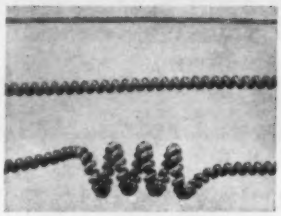
1. ULTRALUME™ PHOSPHORS. Westinghouse research has proved that the size of the individual phosphor particles which coat the inside of a fluorescent lamp have a direct effect on the amount of light given off. Research has determined a definite range and distribution of particle size. Now, a new and exclusive Westinghouse process selects particles within the range for more efficient light-producing phosphors.



2. MIXED GASES. All fluorescent lamps contain mercury and gases. The gases serve as conductors until the mercury is vaporized. The combination of these gases and mercury vapor then converts electricity into ultraviolet radiation, which, in turn, causes the phosphors to "fluoresce," or light up. Westinghouse engineers have determined that a carefully proportioned mixture of several rare gases produces the best results. Westinghouse uses the right mixture and pressure for each type of fluorescent lamp.



3. TRIPLE COILED ELECTRODES. When a fluorescent lamp is turned on there is a sudden initial bombardment of the electrodes by heavy mercury ions. To reduce this bombardment the emission material which coats the electrode must be heated. If the emission material is not protected, lamp life will be shortened. Westinghouse uses triple wound coils to make sure that the carefully determined amount of emission material is heated quickly and is adequately protected from bombardment.



4. PLATED LEADS. The terrific electron bombardment which takes place inside a fluorescent tube eventually causes particles of the metal supports and leads to sputter off and cause "end blackening." To prevent this, Westinghouse plates the lead wires with super-hard Chrome-Vanadium. Result: tubes that *stay* brighter, end to end.

5. "CUSTOM" ANODES. Anodes act as buffers to cushion the terrific shock of electron bombardment and prevent excessive "sputtering" of emission material from the electrodes. Since the electrical characteristics are different for each type of fluorescent lamp, Westinghouse anodes are especially engineered to fit the electrical requirements of each type of lamp.

6. SILICONE "RAINCOATS". Moisture is the invisible enemy of fluorescent lamps. In high-humidity areas, moisture can collect on the exterior surface of the lamp and prevent it from starting. To protect against moisture accumulation, Westinghouse fluorescents are given a special Silicone coating, or "raincoat," which disperses this film into harmless droplets.

You get

MORE LIGHT PER DOLLAR

from Westinghouse

2800 LUMENS
(cool white)

IN THE NEW "UNIVERSAL" PREHEAT-RAPID START LAMP . . . Now you can greatly simplify ordering, stocking and maintenance by specifying this one lamp for the job that two different types have been doing! Specially designed electrodes allow you to use this 40-watt lamp on either your present rapid start or preheat circuits with no loss in lumen output. And prices have been reduced to only $1.25 list—5¢ less than old-style Rapid Start Lamps!

9000 LUMENS
(cool white)

IN THE BRIGHTEST 96" HIGH OUTPUT LAMP YOU CAN BUY . . . Light output improved 23% over present H.O. type (High Output) lamps to make this the most economical 96" H.O. type lamp ever developed for application where high output lamps are used . . . 9300 lumens in white and warm white. This brightest of all 96" H.O. type fluorescents is rated at 7500 hours life—more than 2 years actual use in the average installation—and they're designed to operate on present 96" H.O. ballasts.

3200 LUMENS
(cool white)

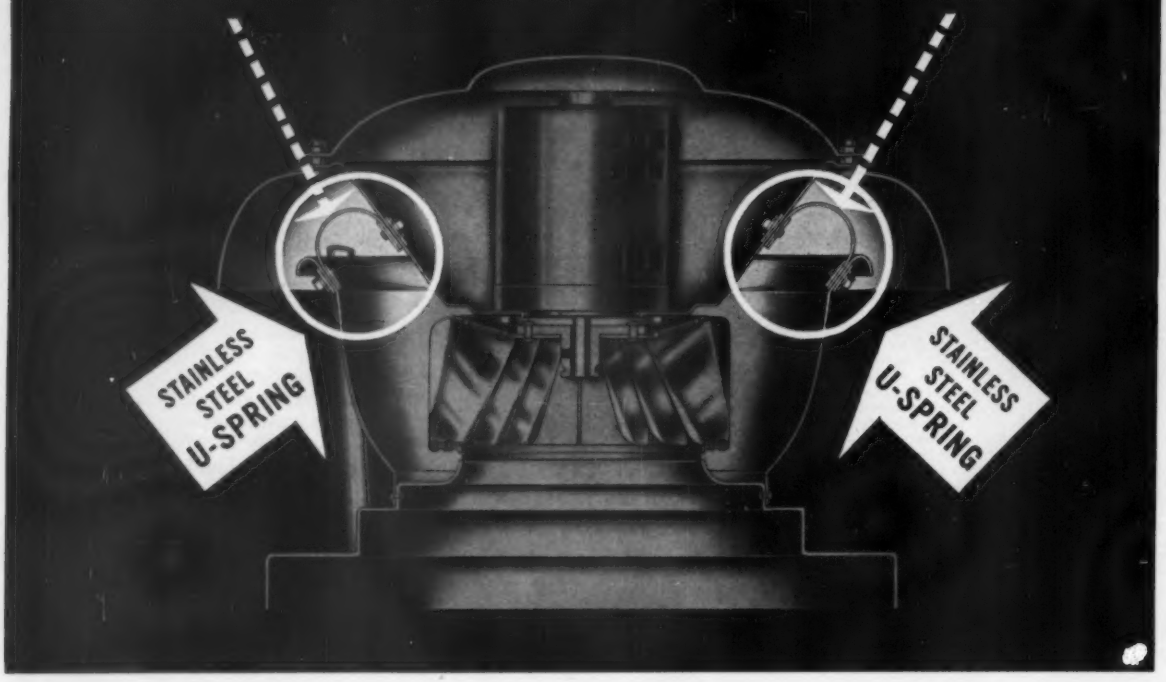
IN THE HIGHEST-RATED 40-WATT LAMP . . . Get 21% more light using your *present* fixtures . . . 3310 lumens in white and warm white! This new lamp is the only fluorescent with no "lazy ends"—even the *bases* let light through (optional at slight extra cost). Life rated at 7500 hours at 3 hours per start. List price, $1.45.

CONTACT YOUR LOCAL WESTINGHOUSE LAMP AGENT, OR WESTINGHOUSE LAMP DIVISION, BLOOMFIELD, N. J.

Westinghouse

For more facts circle 570 on Reply Card

GUARANTEED FOR LIFE!



Stainless steel U-spring noise and vibration isolators . . . a Jenn-Air exclusive!

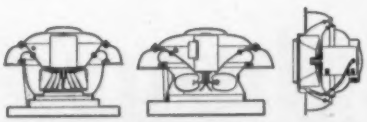
Most power exhausters depend on rubber isolators to dampen noise and vibration. Rubber does a reasonably good job when new, but it cannot withstand the ravages of heat, moisture and oil. Eventually, like the tires on your car, rubber isolators break down, leaving you with expensive repair bills or the need for complete exhauster replacement.

Dissatisfied with the impermanent nature of rubber, Jenn-Air engineers set out to develop a vibration isolator that would not break down. What they perfected was a unique power assembly suspension system built around stainless steel U-springs. Three to five U-springs are now used in each direct driven Jenn-Air Exhauster. They eliminate noise by isolating both radial and lateral vibration . . . and they're *guaranteed for life.*

In addition to providing lifetime service, Jenn-Air U-springs absorb 44% more vibration than rubber isolators. This fact was proved conclusively in independent tests conducted by the Pittsburgh Testing Laboratory.

Effective elimination of vibration is the key to quiet operation and long exhauster life, and Jenn-Air does this job better than any exhauster made! Jenn-Air's complete line of spun aluminum exhausters for roof and wall installation is covered in Bulletin 58-B . . . write for your copy today.

First Name in Power Exhausters

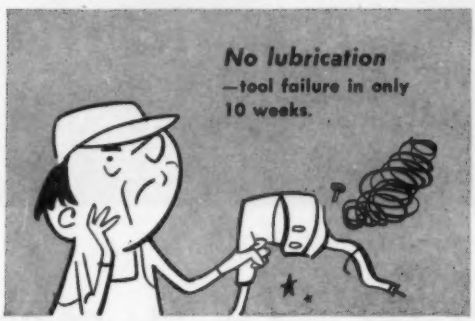


JENN-AIR

Jenn-Air Products Co., Inc. • 1102 Stadium Drive, Indianapolis 7, Ind.

Tests prove Air tools operate over 20 times longer

Lubricated with Norgren MICRO-FOG!



Test Conditions: Air operated screw drivers were tested under identical, carefully controlled simulated working conditions. In one test, no lubrication was provided. In the second, Norgren MICRO-FOG Lubrication was injected into the compressed air system powering the tool.

Results: *Without lubrication,* maintenance was required after only 71,400 cycles (equivalent to 7 weeks normal operation). Rotor blades were then reversed. Complete failure occurred after 101,400 cycles (10 weeks normal operation).

With MICRO-FOG Lubrication, even after 2,101,400 cycles (equivalent to 4.2 years normal operation) inspection showed only slight wear.

This means a big savings for you in air tool replacement costs...your tools operate over *20 times longer* lubricated with Norgren MICRO-FOG.

For complete information, call your nearby Norgren Representative listed in your telephone directory—or WRITE FOR DESCRIPTIVE LITERATURE.

If it's Norgren...It's Dependable.

C. A. NORGREN CO.

3443 SO. ELATI STREET • ENGLEWOOD, COLORADO

For more facts circle 572 on Reply Card

USS American Bridge fabricates and erects 30,000 tons

This is Reynolds Metals Company's new aluminum reduction plant at Massena, New York. American Bridge Division of United States Steel fabricated all of the steelwork and erected all buildings, tanks, conveyers and stacks.

It was a big job . . . completed on schedule.

Have any industrial construction coming up? Contact the nearest American Bridge office in any of the cities listed on the following page.

USS is a registered trademark

# of steelwork for giant new industrial plant

Here are dimensions of some of the major installations:

. . . 111' x 934' metal service building, with 20'6" x 400' lean-to.
. . . Six pot room buildings, each 63' x 1,315', one story, with crane runway.
. . . 90' x 505' machine shop.
. . . Detanking building, 41' x 80', 55' high.
. . . Four storage tanks, 16' dia. x 48' high.
. . . Two storage tanks, 46' dia. x 48' high.
. . . Eight storage tanks, 50' dia. x 33'3" high on 45' towers.
. . . Fourteen fume stacks 8'6" dia. x 110' high with conical base.

USS American Bridge Division of United States Steel

General Offices: 525 William Penn Place, Pittsburgh, Pa.
Contracting Offices in: Ambridge • Atlanta • Baltimore • Birmingham • Boston • Chicago Cincinnati • Cleveland • Dallas • Denver • Detroit • Elmira • Gary • Harrisburg, Pa. Houston • Los Angeles • Memphis • Minneapolis • New York • Orange, Texas Philadelphia • Pittsburgh • Portland, Ore. • Roanoke • St. Louis • San Francisco • Trenton
United States Steel Export Company, New York

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For the best Jib Crane VALUE...

Get Borg-Warner QUALITY and PERFORMANCE

FULL 360° ROTATION

N-PBM

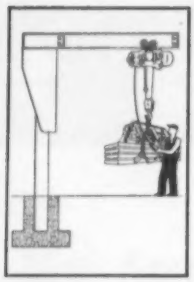
Jib Master

MAXIMUM COVERAGE

$495.00

for a 1-Ton, 10 Ft. Span, 10 Ft. Under Boom Pillar Base Mounted Jib Crane with all these superior features:

1. Head assembly pivots on heavy-duty tapered roller bearing.
2. Head assembly accurately positioned and welded for perfect alignment of jib. Heavy side plates.
3. Two large-diameter, carefully machined side rollers, each with two precision ball bearings for smooth jib rotation.
4. Heavy wall seamless steel pillar.
5. Heavy circular base plate, 6 large gussets and pillar welded together to form a rigid frame.



The Jib Master is also available with Pillar Foundation Mounting, designated N-PFM. Either model can be used with chain block or electric hoist.

Mass-production economies put Jib Master way out front in performance and value . . . and at a price you can afford.

Entirely self-supported, Jib Master swings freely through a full 360° for efficient hook coverage over the maximum work area. Two bottom load carrying rollers, each have two heavy duty precision ball bearings. The top thrust bearing is a heavy duty tapered roller bearing. Heavy side plates are welded to head assembly for perfect alignment of jib. Six large gussets form a rigid all welded unit with pillar and heavy steel base plate.

Whatever your overhead materials handling requirements, it will pay you to write for full details and prices today or call your local B-W Industrial Cranes distributor.

Industrial CRANES — INGERSOLL PRODUCTS — B-W — BORG-WARNER

Design it better . . .
Make it better.

Find Your Nearest Distributor Under CRANES In The Yellow Pages

Distributors in all principal industrial cities.

Borg-Warner® INDUSTRIAL CRANES

1514 PAULINA STREET, CHICAGO 8, ILLINOIS

Export Sales: Borg-Warner International, 36 South Wabash St., Chicago 3, Illinois

For more facts circle 574 on Reply Card

Keeps his bearings with NEBULA® EP

Consider your maintenance man—a very important figure in your cost-cutting plans. He likes to give bearings special attention because they're the focus of strain and wear. An outstanding multi-purpose lubricant such as Nebula EP helps him keep bearings in top condition—helps you keep repair bills down.

Because of its exceptional range of usefulness, Nebula EP is suitable for virtually all grease applications—including bearings subject to extreme pressure, moisture and temperature conditions. Nebula EP is insoluble when immersed in boiling water, resists break-down when exposed to running water or steam! It retains optimum consistency over a wide range of bearing temperatures, resists thinning even at temperatures up to 500°F.

With Nebula EP1, your maintenance man can work faster, too. Nebula EP flows easily in dispensing equipment, and this one grade eliminates the need for several grades of ordinary greases. It is also available in labor-saving cartridge form. For more information on how this outstanding lubricant can bring savings to your operation, call your nearest Esso office, or write: Industrial Lubricants Division, Esso Standard Oil Company, 15 West 51st Street, New York 19, New York.

Esso

In Industry after Industry..."ESSO RESEARCH works wonders with oil"

For more facts circle 575 on Reply Card

For more facts circle 576 on Reply Card ⟶

ALL SIZES, ALL BODY PATTERNS FOR ALL APPLICATIONS

BALANCED VALVES
— for air, steam, water, gas. Designed for applications where close control is required, where pressures exceed those of single-seated valves, and where tight closing is not required. Double-seated construction, approximately 98% tight closing. Sizes ½" to 14". Wide choice of models, capacities and operating features.

COIL VALVES
— for medium pressure steam, liquid, air or gas. Long-life molded rubber diaphragms. ½" to 6" sizes. Body patterns and features for many applications.

CONVECTOR VALVES
Compact size for installation in confined spaces, inside or outside convector enclosures. Models for low pressure steam, hot and cold water. All models have "Sylphon" metal bellows operators. Sizes ½" and ¾".

LIQUID VALVES
— for low pressure hot or cold water service. Choice of molded rubber diaphragms or seamless "Sylphon" bellows. Removable tops. Wide choice of features and body patterns. Sizes ½" to 8".

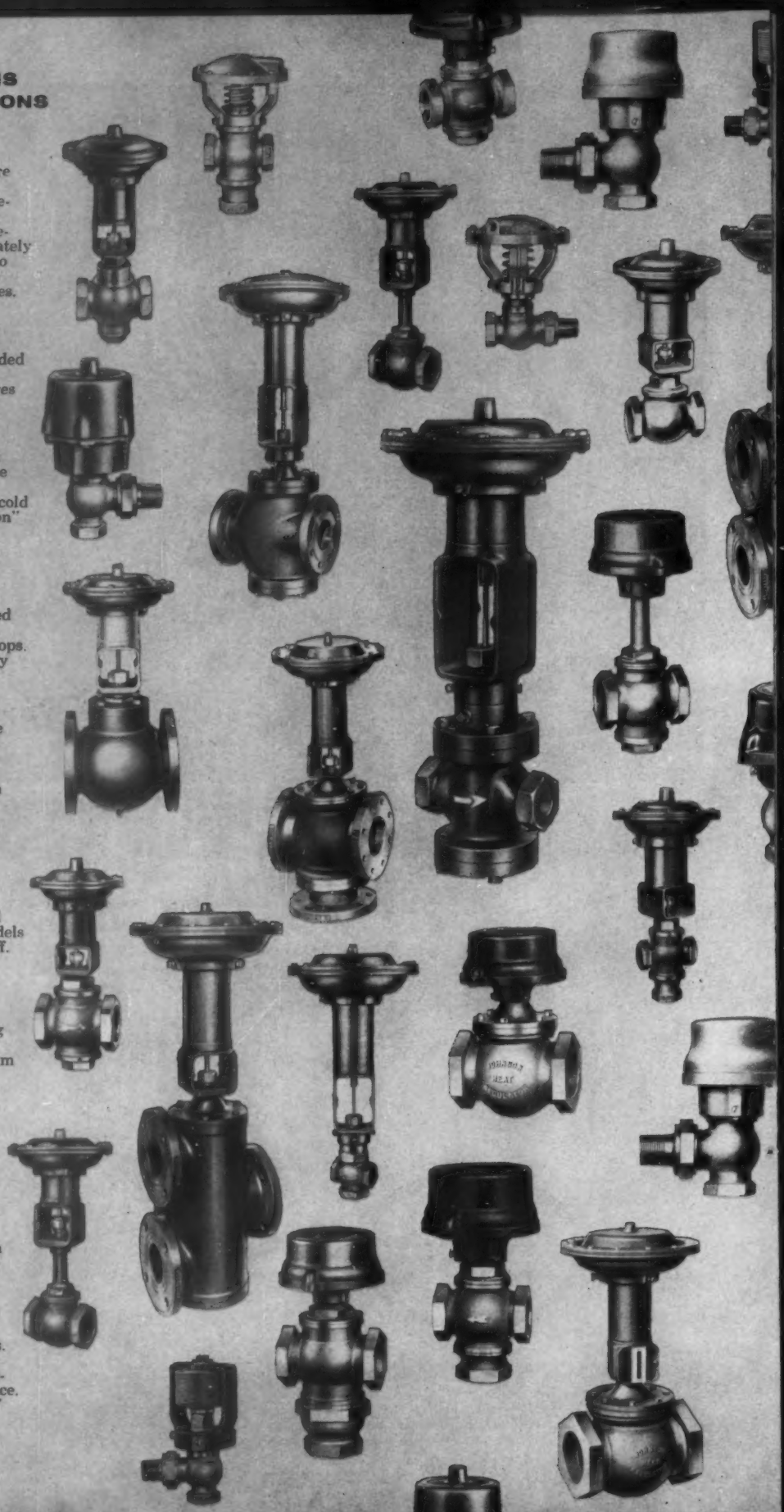
MIXING VALVES
— for applications requiring the mixture of liquids at different temperatures under control of a thermostat or humidostat. "Sylphon" and rubber diaphragm operators. Removable tops. Available in ½" to 10" sizes. Body patterns and operating features for every application.

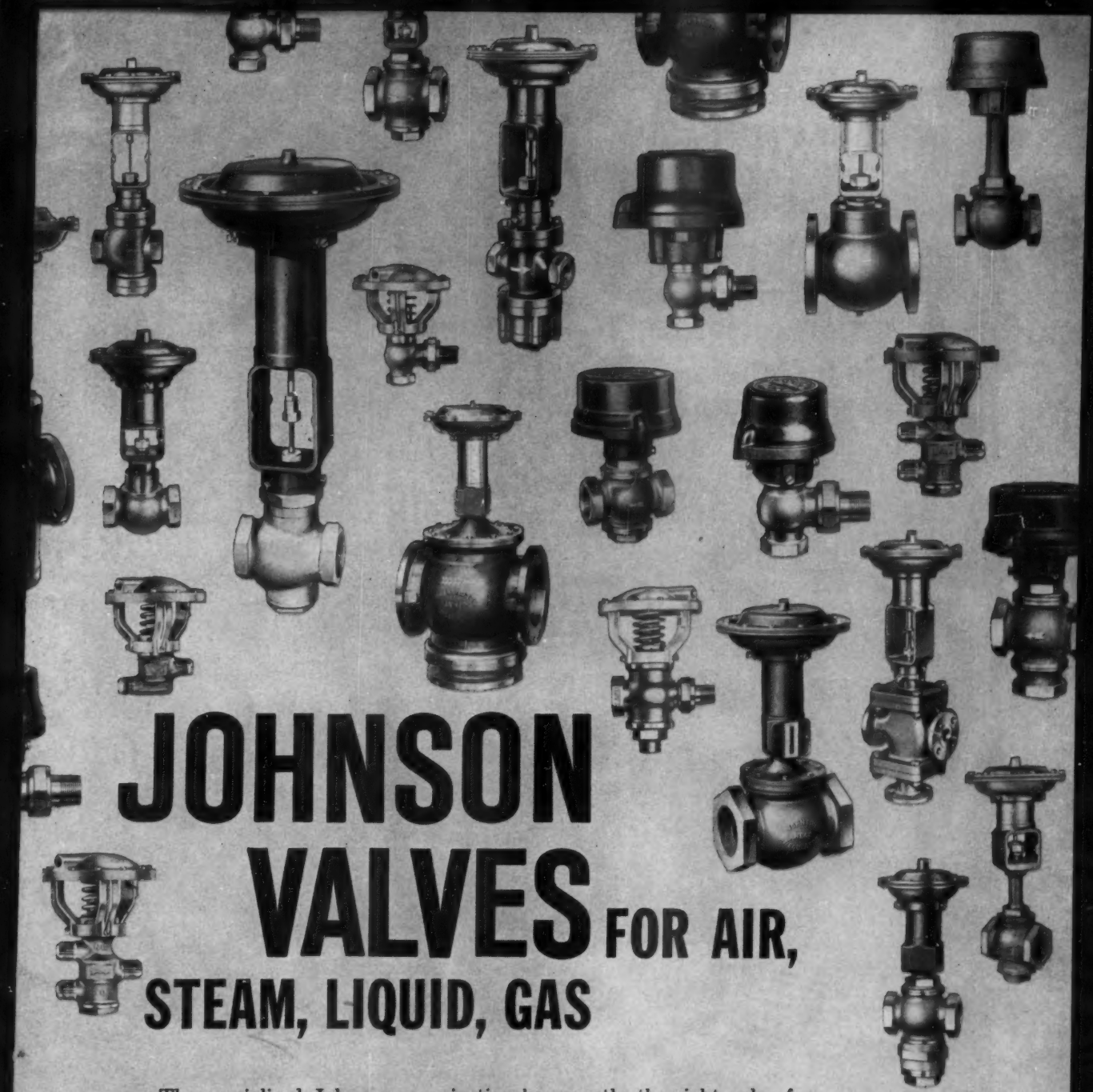
BY-PASS VALVES
— for control of liquids over a wide range of temperatures and pressures. Sizes ½" to 6". Models available with 100% tight shutoff. Removable operators.

WATER VALVES
— especially designed for use with small room air conditioning and heating units. High grade bronze bodies. Rubber diaphragm operators. Corrosion resistant throughout. V-ring self-sealing packing assures positive seal. Renewable composition discs. Sizes ½" and ¾".

STEAM VALVES
— for control of low pressure steam. Rubber diaphragm or seamless "Sylphon" operators. Renewable composition discs especially compounded for steam service. Sizes ½" to 10". Choice of body patterns and features.

BRINE VALVES
— for control at pressures up to 50 psi. Cast iron or bronze bodies. Rubber diaphragm or "Sylphon" operators. Renewable discs, especially compounded for brine service. Removable tops. Sizes ½" to 8" in a variety of body patterns.





JOHNSON VALVES FOR AIR, STEAM, LIQUID, GAS

The specialized Johnson organization has exactly the right valve for every possible air-conditioning, heating, or ventilating control system application. In fact, Johnson makes the most complete line of pneumatic equipment in the industry — for solving any problem of temperature, humidity, or pressure control.

JOHNSON CONTROL

PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

JOHNSON SERVICE COMPANY
507 East Michigan St., Milwaukee 1, Wisconsin

☐ Have a Johnson engineer call on me.

☐ Send your new condensed catalog of all types of Johnson Pneumatic Control equipment.

Name.....

Title.....

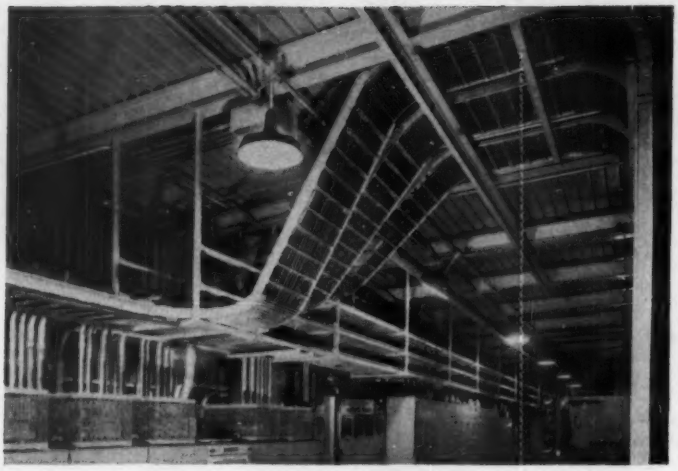
Firm.....

Address.....

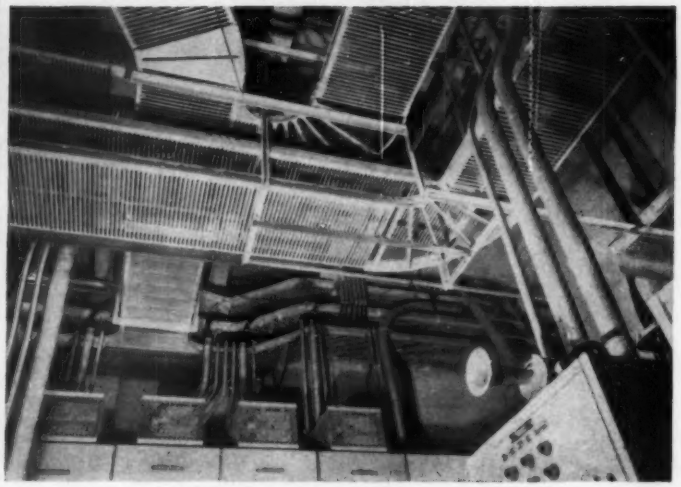
City..... State.....

how INLAND STEEL uses GLOBE INTERCHANGEABLE TRAYS

to support cables in their Indiana Harbor Plant



★ Engineered for Uniform Design and Easy Installation
★ Steel or Aluminum Construction
★ Complete Accessories for SPEEDIER Installation
★ Complete Interchangeability
★ No Sharp Edges to Damage Cables



Globe's two types of cable trays, one a ladder type and the other a basket type, to support cables, wiring and tubing have become increasingly popular because they can be used INTERCHANGEABLY at any given location depending on the type and weight of the cables to be suspended. The advantages of each type tray can be used to the fullest. Globetray, the ladder type, is intended for use where festooning is not a problem, while Cable-Strut, the basket type, is used for the support of communication wire, instrument tubing and control cables in automation applications.

These two cable trays have been thoroughly field tested in hundreds of large industrial installations, in new plant construction, in power plants and for power distribution in all types of manufacturing processes. Send for FREE catalog giving full information and installation techniques.

PRODUCTS DIVISION
THE GLOBE COMPANY Manufacturers since 1914
4016 S. Princeton Ave., Chicago 9, Ill.

Representatives in all principal cities . . . consult the yellow pages in your phone book under "Conduits" for the one nearest you.

For more facts circle 577 on Reply Card

YARWAY IMPULSE* is the only steam trap that continually samples fluid in the line to maintain condensate discharge close to steam temperature, eliminating condensate as soon as it forms.

Condensate seals the small control orifice against steam leakage under all normal operating conditions.

Here's why your best steam trap buy is Yarway Impulse—

1. GETS EQUIPMENT HOT FAST—AND KEEPS IT HOT
2. ONLY ONE MOVING PART
3. LOW MAINTENANCE
4. SMALL SIZE—LIGHT WEIGHT
5. GOOD FOR ALL PRESSURES
6. NON-FREEZING
7. COMPLETE LINE FOR EVERY REQUIREMENT

* A COMPLETE LINE OF STEAM TRAPS, ALL OPERATING ON A PROVEN THERMODYNAMIC PRINCIPLE

YARWAY impulse®

Manufactured by YARNALL-WARING CO., 145 Mermaid Ave., Philadelphia, Pa.
Stocked and sold by 270 Industrial Distributors
Write for free bulletin "The Why and How of Steam Trapping"

For more facts circle 578 on Reply Card

NEW SPRING-MANUAL CLOSING MECHANISM provides positive manual operation of DB-15, DB-25 and DB-50 circuit breakers used in Westinghouse power centers. Here G. D. Gamel, DB breaker design engineer, is ready to close a spring-manual operated DB-50 unit.

Westinghouse power centers offer greatest component selection... plus new switchgear insulation

You Can Choose the Breaker Operation You Need. Low-voltage air circuit breakers (DB-15, DB-25 and DB-50) provided in Westinghouse power centers are now available with a choice of manual, spring-manual or electric closing mechanisms. In accordance with industry standards, DB-75 and DB-100 breakers are available with an electrically operated closing mechanism only.

You Can Choose the Transformer You Need. As with breaker closing mechanisms above, Westinghouse gives you complete freedom of choice in selecting the power center transformer best suited to your application. Within code limitations, you can choose *oil-filled* for outdoor service . . . *Inerteen®-filled* for outdoor or indoor service where a nonflammable, liquid-cooled transformer is desirable . . . *ventilated dry-type* for maximum safety and minimum maintenance under controlled atmospheric conditions, indoors . . . and *sealed dry-type* for complete safety and virtually no maintenance, under adverse atmospheric conditions, indoors or outdoors.

New Westinghouse Insulation of improved glass polyester material is used for bus supports and short circuit bracing in Westinghouse low-voltage metal-enclosed switchgear. In addition to being highly track resistant, this new insulation is also flame retardant, and the design of supports and bracing provides increased vertical creepage distances. Result is maximum safety with minimum maintenance.

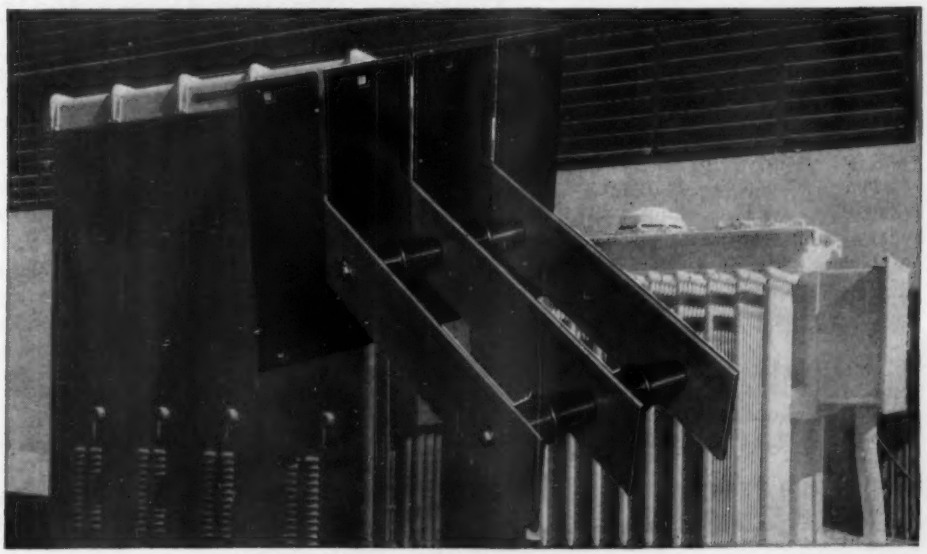
These features are only a few of the continuing product improvements that provide true bonus values beyond specification in Westinghouse power centers. For complete details, call your Westinghouse representative—or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

J-60979

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS

NEW WESTINGHOUSE GLASS POLYESTER INSULATION is used for bus supports and bracing in low-voltage metal-enclosed switchgear of Westinghouse power centers.



For more facts circle 579 on Reply Card

Processing belts must withstand destructive forces that ordinary conveying belts never encounter.

When processing is your problem... specify
Wissco Woven Wire Belts

There are two general categories of belts. First, belts that merely *convey* products from one place to another under normal conditions. Second, belts that are an integral part of a *process*—where conditions exist such as heating, sudden cooling, corrosion, abrasion, or circulation of gases or liquids. For ordinary conveying, many types of belts will fill the bill. But for processing, just any belt won't do—a *woven wire belt* is the best answer. Here's why Wissco Woven Wire Belts meet your processing requirements:

1. Wissco Belts have an **open mesh**—permitting free circulation or drainage of air, liquid or gases. Corrosive liquids do not stay on the belt. And the open mesh allows rapid and efficient heating or cooling of the product conveyed.

2. Wissco Belts are made of **steel**—plain, tinned, galvanized, stainless or special alloy—to meet temperature extremes, corrosive or abrasive conditions, or operational wear.

3. Wissco Belts are **pretested**, including furnace testing if required, without cost to you. You know your Wissco Belt has operated correctly before you get it.

You also get these Wissco services: belts washed and degreased before shipment, then shipped on a reel (no charge for the reel). A Wissco reel, often replacing several packing crates, saves you freight and handling charges, and makes installation quicker and easier.

Your Wissco Belt engineer is always available to help with your belt installation or operating problems. Contact the CF&I office nearest you today.

WISSCO BELTS
THE COLORADO FUEL AND IRON CORPORATION

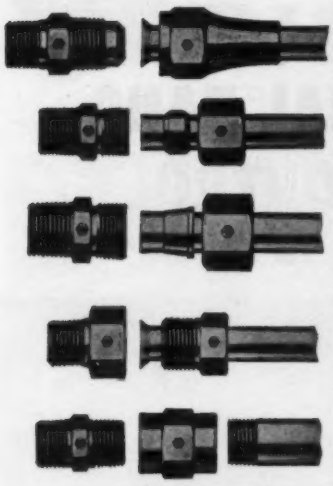
CF&I STEEL

In the West: **THE COLORADO FUEL AND IRON CORPORATION**—Denver and Oakland
In the East: **WICKWIRE SPENCER STEEL DIVISION**—Atlanta · Boston · Buffalo
Chicago · Detroit · New Orleans · New York · Philadelphia

7081

For more facts circle 580 on Reply Card

brass tube fittings



S.A.E. 45° FLARE
USE with copper, brass, aluminum, steel and plastic tubing. U.L. listed; A.G.A. approved. Meets SAE Hydraulic standards and A.S.A. and A.S.M.E. codes. PRESSURE RATING: up to 3000 p.s.i. Sizes: ⅛" to ¾".

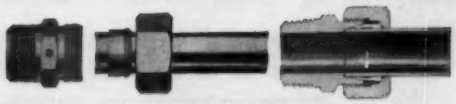
COMPRESSION
USE with copper, brass, aluminum and plastic tubing. U.L. listed; A.G.A. approved. Meets SAE Hydraulic Tube Fittings Standards and A.S.A. and A.S.M.E. codes. PRESSURE RATING: up to 2000 p.s.i. depending on O.D. of tube. Sizes: ⅛" to ¾".

SELF-ALIGN®
USE with copper, brass, aluminum and plastic tubing. No flaring, soldering, welding, or special tube preparation needed. PRESSURE RATING: up to 2000 p.s.i. Sizes: ⅛" to ¾".

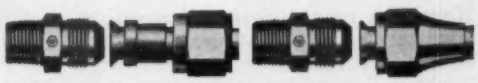
INVERTED FLARE
USE with copper, brass, aluminum, steel and plastic tubing. Meets SAE Hydraulic Tube Fittings and A.S.A. and A.S.M.E. codes. PRESSURE RATING: up to 3000 p.s.i. Sizes: ⅛" to ¾".

PIPE FITTINGS
USE with brass or steel pipe. Meets specifications of SAE TPHL Fittings Committee. PRESSURE RATING: up to 5000 p.s.i. Sizes ⅛" to ¾".

forged steel fittings



ERMETO HYDRAULIC TUBE FITTINGS
Most dependable high pressure fitting in the world . . . easiest installation. FOR FLARELESS TUBE SYSTEMS. No flaring, threading, welding or soldering. Available with carbon steel; stainless steel; cadmium plated or Weathercote finish. Standard Sizes: ⅛" through 2". Pressure Ratings: up to 10,000 p.s.i.



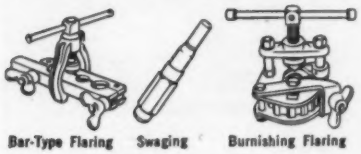
FLARE-TWIN HYDRAULIC TUBE FITTINGS
SAE 37° FLARE (J.I.C.) STEEL FOR FLARE TUBE SYSTEMS. No threading, welding or soldering. Two-pc. and three-pc. carbon and stainless steel with cadmium plated or Weathercote finish. Standard sizes: ⅛" through 2". Pressure Ratings: up to 10,000 p.s.i.

the WEATHERHEAD symbol is your assurance of SERVICE, QUALITY and DEPENDABILITY in all industrial hose and tube fitting needs

tube working tools

Designed to make fast, easy work of every tubing job. We offer a complete line of low cost, quality made tools for cutting, bending and flaring tubing up to ¾" in O.D.

Spring-Type Bender | Mechanical Bender | Tube Cutter



Bar-Type Flaring | Swaging | Burnishing Flaring

hose

Available in over 20 different types for any industrial application up to 10,000 p.s.i. pressures and sizes from ⅛" to 2" I.D. Five standard hoses meet most requirements.

H-9—Low Pressure
H-17—Medium Pressure
H-25—High Pressure
H-69—Medium High Pressure
H-108—Medium High Pressure

hose assemblies

Standard 2-pc. Reusable Ends
Reusable Steel Ends
Reusable Clamp-Type Ends
Permanently Crimped Ends
Tube-Hose Assemblies
Permanently Swaged Ends

YOUR SINGLE SOURCE SUPPLIER OF ALL INDUSTRIAL HOSE AND FITTINGS NEEDS

THE WEATHERHEAD CO.
FORT WAYNE DIVISION • Dept. PL-11, 128 West Washington Blvd. • Fort Wayne, Indiana
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For more facts circle 581 on Reply Card

ANOTHER NEW LESLIE PRODUCT

ADJUSTABLE PROPORTIONAL BAND Floatless LIQUID LEVEL CONTROL

...with adjustable level ranges up to 0-200"

Here is a new differential pressure-type liquid level control pilot that combines the wide adjustable level ranges in the table shown below with a 2-20" or 7-25" adjustable proportional band.

ADJUSTABLE LEVEL RANGE — INCHES	ADJUSTABLE PROPORTIONAL BAND (INCHES, H_2O)	CONTROL PILOT TYPE
0-40 or 0-87	2-20	LAP
0-30 or 0-91	2-20	LABP
0-200	7-25	LAUP

Maximum Static Pressure — 300 psi

One Knob — Easy Adjustment

A single knob adjustment quickly sets the proportional band where you want it, even while the system is in operation. The liquid level is maintained constantly within that band until you re-set the control pilot for new conditions.

Applications

Leslie-Level-Matic Control Pilots are used in either open or pressurized vessels to control the level of virtually any liquid including water, gasoline, oil and chemical solutions. The new control pilot is particularly useful to maintain constant levels where there are high flow rates through vessels with small cross sectional areas.

Float Cages Eliminated

There are no floats or cages needed for Leslie-Level-Matic Control Pilots, and no torque tube seals, stuffing boxes, or thermohydraulic systems. All of the primary control elements are in one place and may be installed with a fraction of the effort and cost required for displacement-type controllers.

Vibration-Proof, Dependable

All of the dependability factors for which Leslie products are so well-known are incorporated in this new control pilot, as well. Rugged, accurate, stable — it is unaffected by normal vibration or turbulence.

More Information

Send for Engineering Data Sheet describing this new Control Pilot and outlining its principle of operation.

Knob and indicator-type proportional band adjustment permits setting in a matter of seconds.

LESLIE REGULATORS and CONTROLLERS

874

LESLIE CO., 457-C Grant Avenue, Lyndhurst, New Jersey

For more facts circle 582 on Reply Card

first in silicones

Dow Corning

SILICONE NEWS

production and maintenance edition • No. 31

$4800 SAVED BY "GOLDEN EGG"

Stepped-up production can mean overloaded motors, which in turn can result in chronic motor failures. While new motors of higher rating will take care of this situation there's often a far less expensive way out.

A Michigan foundry uses three cranes to feed cupolas and do regular yard work. A speed-up in production caused the Class A crane motors to fail immediately. Not too keen on spending $7200 for new mill-type motors, management solved the problem for only $2400. How? By having all three motors rewound with Dow Corning Silicones, saving the company $4800. What about performance? The latest report is that the cranes operate 16 hours a day, handling a heavier cupola schedule, plus normal yard work. There hasn't been a single insulation failure since silicone materials were installed back in 1952.

When your motors give trouble, call the service shop that displays the emblem shown at left.

This emblem identifies the shop that rewinds motors with quality materials made with Dow Corning Silicones. Motors with this emblem provide more power, more overload capacity, longer service and require less maintenance.

The protection silicones give against heat, moisture, weathering, corona, dust and abrasive action is your guarantee of greater motor life. Specify silicone rewinds to save your company money and headaches. And remember: only rewind shops displaying the golden symbol of quality are qualified to give you approved Dow Corning silicone service. *No. 747*

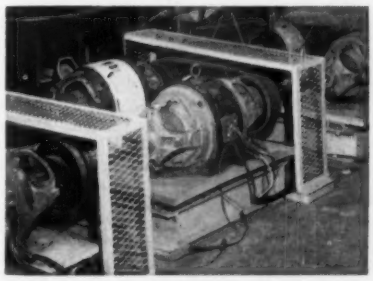
GLOVELESS GLOVE

Working with greases, oils, solvents and detergents can lead to dermatitis . . . and many lost man hours. The wearing of protective gloves will help, but this isn't always feasible.

In one operation at a large aircraft plant, for example, metallic parts are bathed in a kerosene solution. All employees on this operation are women and all contracted some degree of dermatitis. Because of the smallness of the parts and the solvent used, wearing rubber or plastic gloves was out of the question.

After lengthy testing, the firm finally found excellent results with a protective hand lotion. The lotion: Silicare, a product of Revlon, Inc., containing a generous amount of Dow Corning Silicones. The finding: When hands were protected with Silicare, all employees involved reported normal skin color and absence of swelling. It was quickly accepted by the women as an easily applied, good-feeling product. Silicone containing Silicare solved the problem by acting as a "gloveless glove".

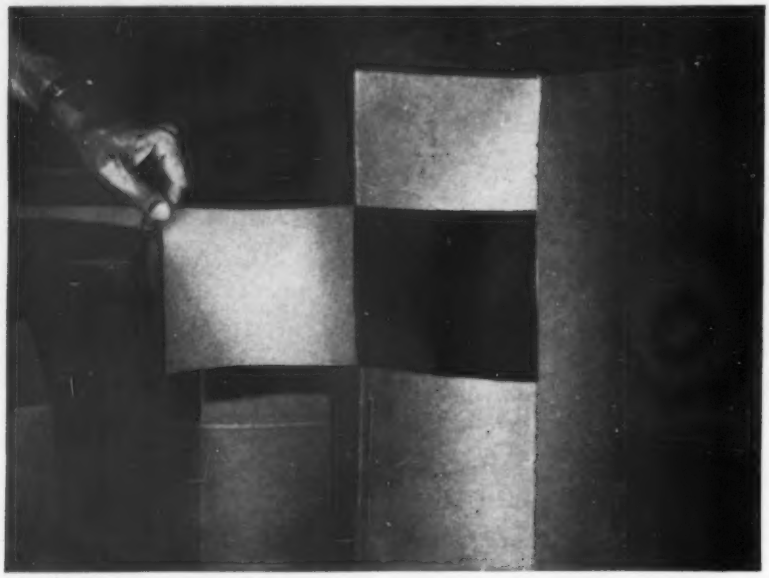
Silicones can do this because they form a lasting barrier against many irritants, keeping hands soft and smooth. They're never greasy . . . won't make skin feel oily or slippery. Perhaps a lotion containing Dow Corning Silicones can help you eliminate skin irritation at your plant. Why not give it a try? *No. 748*



Motor Methuselah

Over 13 years ago — June 6, 1946, at 10 a. m.—a motor test began in the Dow Corning laboratories. Today the test motor is still running after more than 85,000 hours of operation at extreme overload which produces temperatures of 240 C.

The 10 hp motor is insulated with Dow Corning silicone materials (Class H) and generator loaded to operate *(Cont. pg. 2)*



STICKY PRODUCTS COME OFF IT

If you can't release sticky products from containers or wrapping, it means wasted material and lost time. Here's helpful news on how to avoid such waste.

Trumbull Asphalt Company of Delaware is a major independent producer of asphalt, a material that's especially hard to handle. In packaging for shipment, they pour 100 pounds of asphalt at 350 F into cartons, then cool it for 48 hours. Considering this heat and the 100 lb. pressure, you might ask: how is the asphalt ever removed from the cartons? Why doesn't it stick like crazy?

Normally, it would. But at Trumbull, the problem doesn't exist . . . their kraft containers are coated with Syl-off, the Dow Corning silicone paper treatment. Practically nothing will stick to this coating, asphalt included; Syl-off gives really amazing release. Trumbull finds that it does a much better job than the clay coated paper they formerly used.

The silicone coating is applied by National Container Corporation, whose engineers also have a good word for Syl-off. They've found that the silicone treatment is easier to apply and control than clay coatings, and weighs as much as 100 pounds *less* per 1000 drums. This weight difference substantially reduces freight charges on carload shipments!

Syl-off coatings are available on most types of paper and paperboard containers and some are suitable for food products. Whether you ship, store or receive sticky materials, a silicone paper coating will benefit your company. *No. 749*

SILICONE *(Continued)*

at its test temperature of 240 C (60° over normal Class H operating temperature). Every 500 hours of the test period the motor is stopped and exposed to 100% relative humidity for 24 hours. Today, this motor is approaching 90,000 hours of service at a copper temperature of 240 C. This is equivalent to 516 years of operating time at 180 C!

This test, and countless on-the-job applications, prove that insulation systems made with Dow Corning Silicones assure long, trouble-free service in rough environments. How about *your* motors? *No. 750*

new literature and technical data on silicones

Easy To Use — Dow Corning 5 Compound curtails arcs, shorts, and the formation of leakage paths on insulators exposed to contaminated atmospheres. In addition, 5 Compound is easy to apply and reduces cleaning time and costs. It can be removed without the use of solvents or abrasives, and the time intervals between cleanings are substantially increased because of the longer-lasting protection provided by this grease-like silicone compound. An illustrated data sheet gives details. *No. 751*

A Code Is Your Key to where you can get the Silastic material you want. A recently revised list of Silastic fabricators is letter-coded to let you know at a glance which rubber companies calender, dispersion coat, extrude, mold, sponge, or make ducting, hose, o-rings, rollers, or specialty parts from Silastic. If you consider ALL the properties of a silicone rubber, you'll specify Silastic from one of these fabricators. *No. 752*

You Can Foil Foam — Dow Corning defoamers kill foam that develops in the processing of chemicals, petroleum, asphalt, paper, textiles, food and drugs. A pamphlet indicates the minute amount of silicone defoamer required to gain added working space, decrease production time and trouble in metal working and each of the above processing industries. Investigate the savings made possible with defoamers by encircling *No. 753*

Good Service That Shows — A new reprint from Products Finishing explains the maintenance and production savings silicone coatings can afford. The gloss retention and chalk resistance of silicone surface coatings are excellent . . . even when plant equipment is exposed to wide ranges of ambient temperatures over a period of years. Maintenance costs decrease, intervals between refinishings increase, and appearance is improved. This reprint contains case history illustrations and tables showing properties of several silicone coatings. Write for . . . *No. 754*

Visual Proof — The many benefits of silicone electrical insulation are shown in the sound and color movie, More Muscles for Tomorrow. A descriptive folder tells how to arrange for showings in your plant. *No. 755*

Dow Corning Corporation, Dept. 9623, Midland, Michigan
Please send me: 747 748 749 750 751 752 753 754 755

NAME _____
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SILICONE NEWS is published for production and maintenance men by

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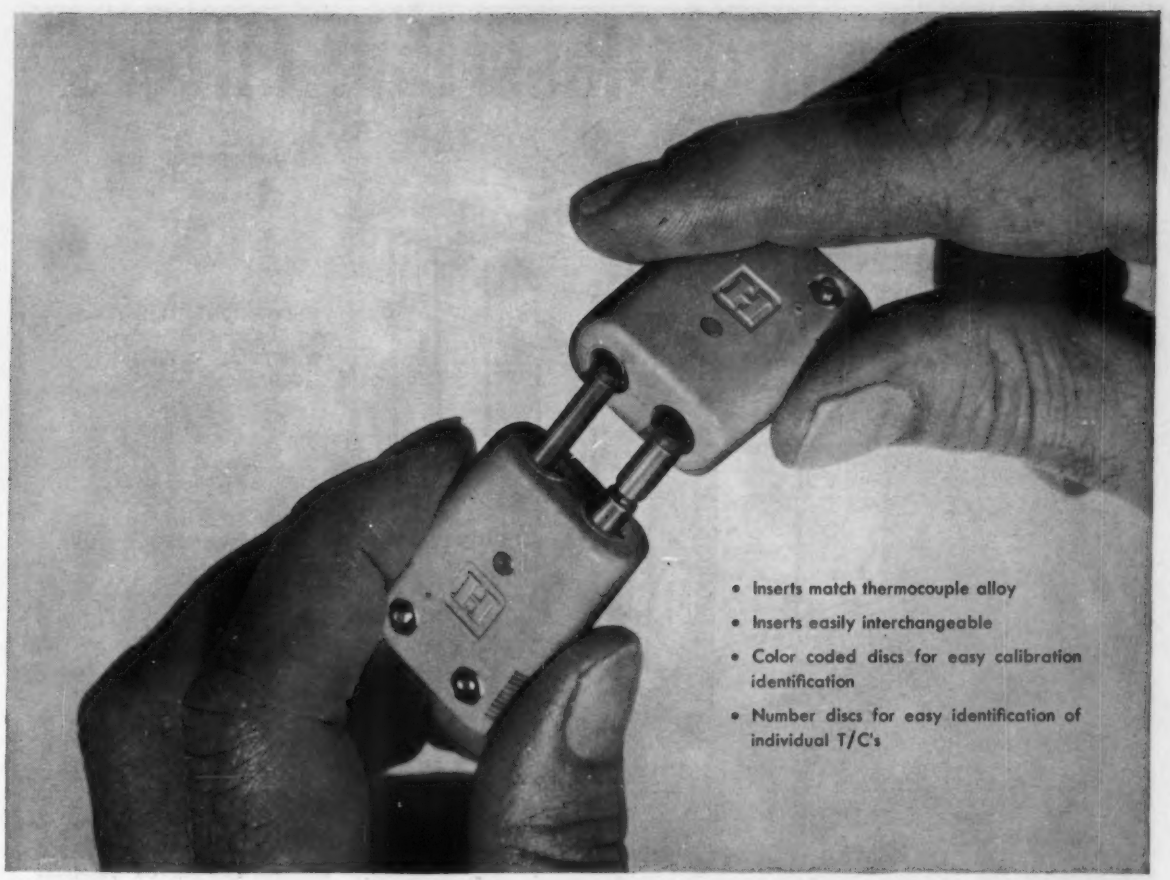
• Inserts match thermocouple alloy
• Inserts easily interchangeable
• Color coded discs for easy calibration identification
• Number discs for easy identification of individual T/C's

NEW *QuiK-Konnect** thermocouple components

For accurate, swift, and foolproof connection of thermocouples to extension wire

New *QuiK-Konnect* plug and jack bodies give fast, easy, and foolproof extension wire connections in plant, laboratory or test cell installations.

Inserts have different diameter positive and negative poles, for foolproof connection . . . are extremely easy to remove for field calibration change or replacement. Various tube adapters are available to protect small-diameter thermocouples, and cable clamps can be supplied to protect extension wires from fraying or tearing.

The *QuiK-Konnect* line, in addition to plugs and jacks, includes:

1. Single-jack panel that fits ¾-in. knockout.
2. 4-point jack panel that fits standard electrical outlet box.
3. Multiple jack strips.
4. Custom-built multiple jack panels.
5. *QuiK-Kords** for patch programming multiple jack panels.

You can get complete details from your nearby Honeywell field engineer. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, 21 Penn St., Fall River, Mass.

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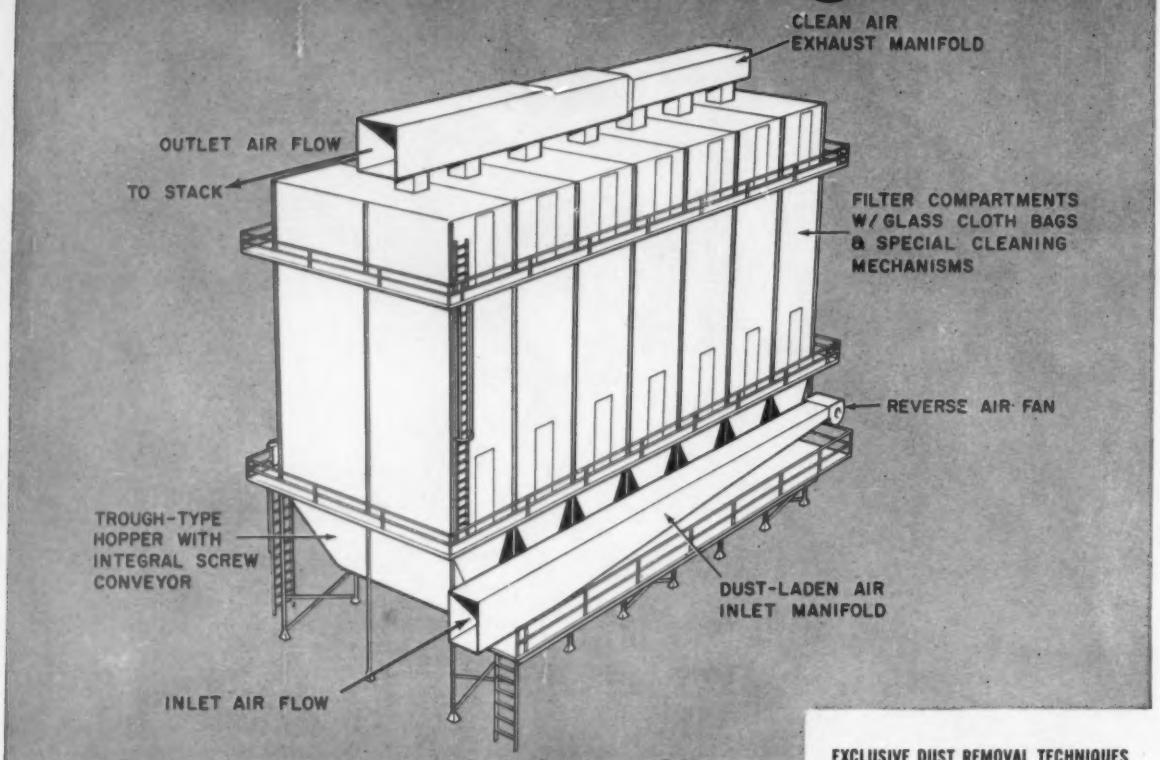
Honeywell

H HONEYWELL *First in Control*

new Dracco Glass-Bag Filters



NOW—the answer to your hot dust problem—

cloth filtration to 600° F. with safe bag cleaning by sonics

Radical design innovations including dust removal by "sound" now make Dracco Glass-Bag Filters a vital new weapon in industry's fight against hot, corrosive dust and fumes.

Safe, fracture-proof methods of cleaning glass cloth bags extend the high collection efficiencies, small operating costs and low maintenance of cloth filtration to the 600° F. temperature range.

This makes Dracco Glass-Bag Filters your best choice for the toughest industrial applications:

cement kilns • reverberatory furnaces • calciners • converters
blast furnaces • cupolas • corrosive chemical processes
carbon black production • steam micronizers

For detailed information on how Glass-Bag Filtration can help you beat that hot dust problem, contact a Dracco engineer now. Or write:

EXCLUSIVE DUST REMOVAL TECHNIQUES ASSURE LONGEST BAG LIFE

Sonoclean—patented cleaning by sonics . . . low-frequency vibrations transmitted to bags at safe energy levels . . . no deflection, creasing or fatigue . . . no bag wear . . . no personnel hazard.

Reverse Air Flow — relaxation of bags accomplished by isolating filter compartment from main collector fan with control valves . . . low-velocity fan provides reverse air to collapse bags . . . results in effective cleaning without wear . . . no shaking required.

Swing-Clean — patented cam action imparts gentle downward wave or oscillating motion to bag . . . removes dust without fracturing glass cloth.

FULLER COMPANY GENERAL

DRACCO DIVISION OF FULLER CO.
4035 East 116th Street • Cleveland 5, Ohio

DRACCO *airstream* conveyors
dust control equipment
(Pronounced Dray'-co)

For more facts circle 585 on Reply Card

THERE MUST BE AN EASIER WAY

OLD PURSEWAD HATES TO PART WITH ANYTHING... ESPECIALLY OLD DRAWINGS!!
JUST PUT A LITTLE MORE TAPE ON THESE... AND THEY'LL LAST FOR YEARS!!
I CAN'T DRAW ON THESE THINGS...THEY'RE ALL TAPE NOW!
I'VE HAD MY GLASSES CHANGED 4 TIMES AND I STILL CAN'T READ 'EM
THE ONLY THINGS THAT SHOW UP ON THE BLUEPRINTS ARE TAPEMARKS AND CREASES
IT'S GOOD THE GUYS IN THE SHOP HAVE GOOD MEMORIES
HE SHOULD CALL IN A JUNKMAN...OR ASK A BLUEPRINTER ABOUT AUTOPOSITIVE PAPER INTERMEDIATES

Much easier for you when you have your print room, or local blueprinter, reproduce old drawings on Kodagraph Autopositive Paper. You get positive photographic intermediates *directly*. Dirt and stains are dropped out . . . weak line detail is turned into dense black photographic lines . . . ends the need for costly retracing. And you get the sharpest blueprints or whiteprints around.

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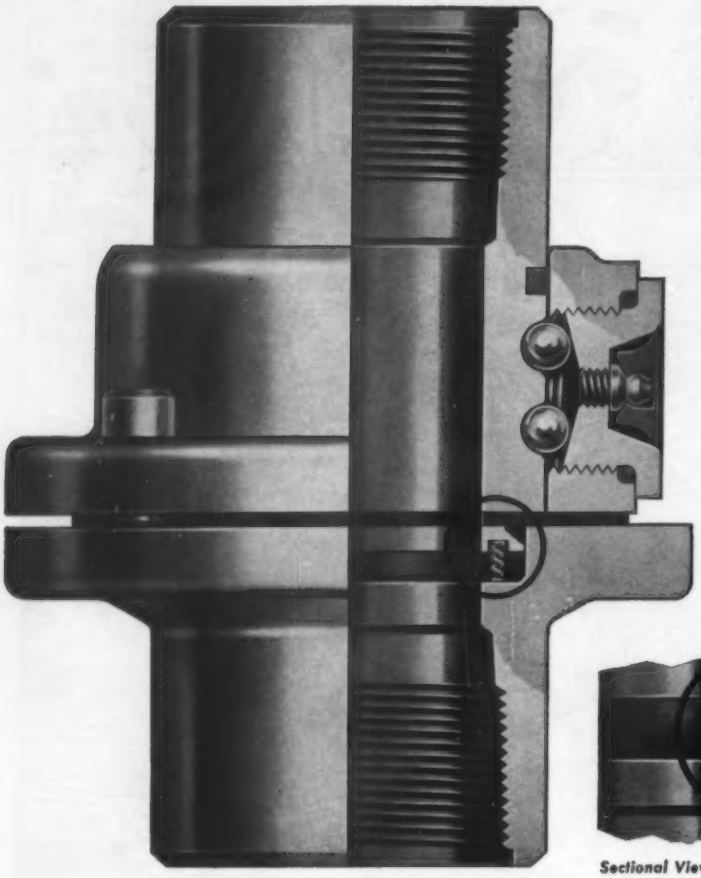
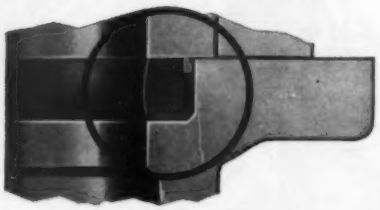
For Trouble-Free Flexibility on Steam, Hot Gas, Chemical Service Lines



For the engineer concerned with flex or rotational problems, on lines handling steam, hot gas or chemicals, the new DS swivel joints present a quick, effective solution. Versatile packing design permits use of either disc or molded types of packing to meet a wide number of services. Split segments allow replacement of packings within minutes and without removing joint from the line. And within the eight basic configurations of the new DS series joint are models to provide full 360° rotation in one, two or three planes. DS series swivel joints are recommended for chemical services ranging from –40° to +400°F and 300 psi. In steam rotation, the maximum is 440°F at 360 psi. For complete details on this remarkable series of Chiksan swivel joints, write today for your copy of Bulletin 1258.

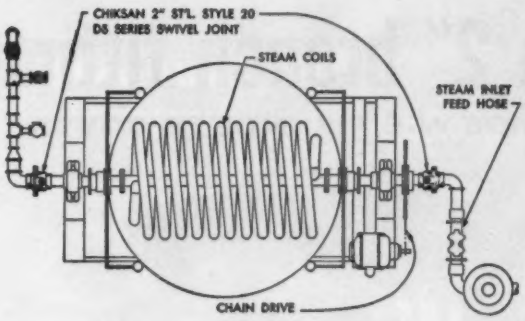


Sectional View showing typical molded packing installed

NEW *CHIKSAN* DS

REPLACE SEALS WITH SWIVEL JOINT IN LINE

Allen-type screws secure the two sections of the DS series swivel joint. Screws are readily removed and seals replaced with joint in the line.

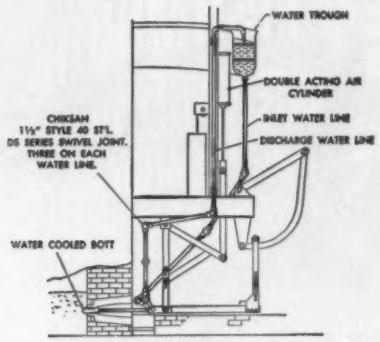


ROTATING STEAM COIL IMPROVES COOKING QUALITY, CUTS COSTS

For more details, request application report .009

Stationary steam coils in a large food processing plant were accumulating burned scale, reducing heat transfer by as much as 20% in a relatively short time.

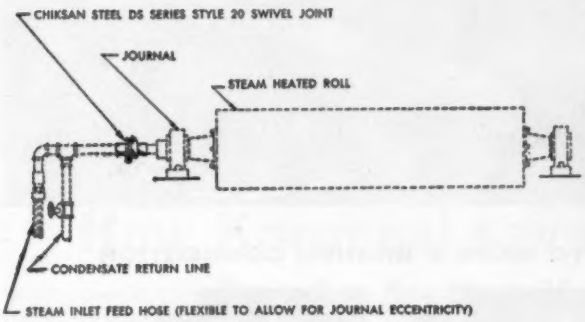
Using Chiksan DS series swivel joints, the plant engineer designed a self-scouring rotating coil. Net results, this plant now gets closer flavor and quality control—also sustains heat-exchange efficiency—thus saving fuel.


WATER TROUGH
DOUBLE ACTING AIR CYLINDER
CHIKSAN 1½" STYLE 40 ST'L. DS SERIES SWIVEL JOINT, THREE ON EACH WATER LINE.
INLET WATER LINE
DISCHARGE WATER LINE
WATER COOLED BOTT

SWIVEL JOINTS HELP PULL THE PLUG ON MOLTEN SLAG

For more details, request application report .014

Pulling the water cooled bott permits removal of molten slag from blast furnaces. Proximity to the intense heat made rubber hoses out of the question. And even ordinary swivel joints weren't faring too well because packings would bake out in a day or two. New Chiksan DS series swivel joints deliver the solution, providing ten to twelve weeks of service before packing replacement is required.


CHIKSAN STEEL DS SERIES STYLE 20 SWIVEL JOINT
JOURNAL
STEAM HEATED ROLL
CONDENSATE RETURN LINE
STEAM INLET FEED HOSE (FLEXIBLE TO ALLOW FOR JOURNAL ECCENTRICITY)

STEAM STAYS ON THE BEAM WITH CHIKSAN SWIVEL JOINTS

For more details, request application report .004

To emboss plastic sheets, the material must be heated to a just-right degree of softness. A steam leak at the swivel joint connecting the stationary steam pipe to the revolving inlet means serious trouble. Previous tried devices were unsatisfactory. A DS series swivel joint was recommended. Present joint has been in service for better than four months with superior results. And when packing fatigue does occur, it can be quickly replaced with a minimum down time.

SWIVEL JOINTS
SERIES

CHIKSAN COMPANY, 330 North Pomona Avenue, Brea, California
Please send me copy of Bulletin 1258.
Please send me product application report .004 ☐ .009 ☐ .014 ☐

Name_____

Company_____ Title_____

Address_____

City_____ Zone_____ State_____

CHIKSAN fmc ®

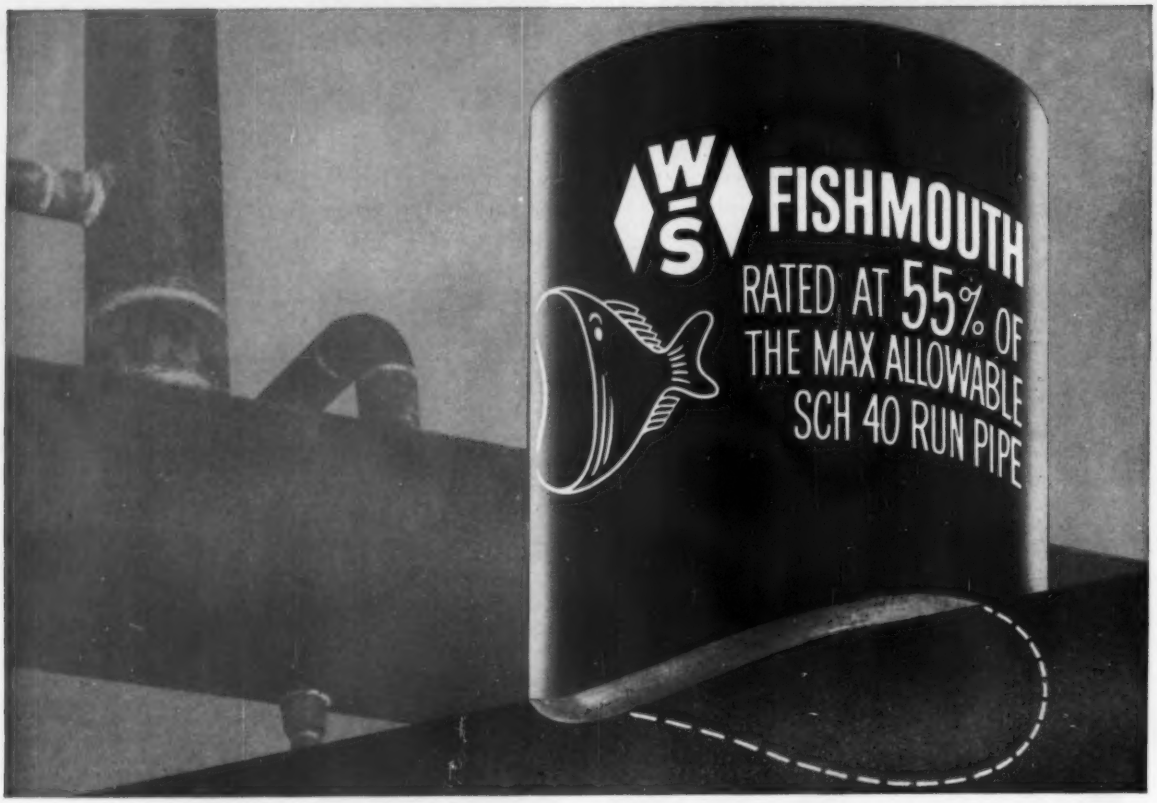
A SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

CHIKSAN COMPANY—Brea, Calif. • Chicago 5, Ill. • Newark 2, N. J. • Weco (Division), Houston 1, Texas • Subsidiaries: Chiksan Export Co. • Chiksan of Canada Ltd.

FOR BRANCH CONNECTIONS 2 INCHES OR OVER:

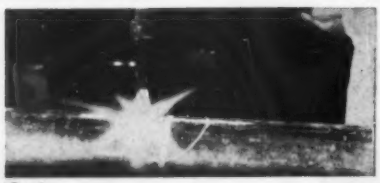
Now! Only 81¢ for a 2″ branch fitting!

THAT'S ALL A NEW, READY-MADE W-S FISHMOUTH COSTS

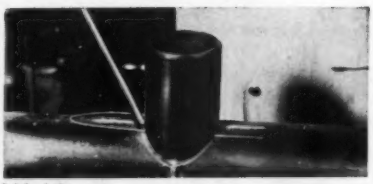


IT'S THE MOST PRACTICAL WAY TO MAKE A BRANCH CONNECTION

Mark



Cut



Weld

The W-S FISHMOUTH saves 50 per cent or more over commercially available branch fittings . . . *costs even less than your own field- or shop-made connection.* Made from Schedule 40 pipe, W-S FISHMOUTH is fully machined and perfectly shaped for strong, leak-proof joints. A ready-made W-S FISHMOUTH is rated for working pressures to 55 per cent of maximum run-pipe limits. Sizes: 2″ to 12″ IPS, butt weld ends. Fewer sizes handle many more jobs, eliminate need for special fittings.

No time or cost required to shape, fit or bevel. Ideal for close-quarter work. Easy access to inspect weld penetration or to back-weld. W-S factory machining means a secure, permanent installation every time.

Ready-made, the W-S FISHMOUTH costs less to buy and install than anything you can buy or make. Write, today, for complete information, prices and names of distributors to: *Forge and Fittings Division, H. K. Porter Company, Inc., Box 95, Roselle, N. J.*

FORGE AND FITTINGS DIVISION **PORTER** **H.K.PORTER COMPANY, INC.**

PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION; Specialty Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION, H. K. PORTER COMPANY de MEXICO, S. A.; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Nepcoduct" Systems—H. K. PORTER COMPANY (CANADA) LTD

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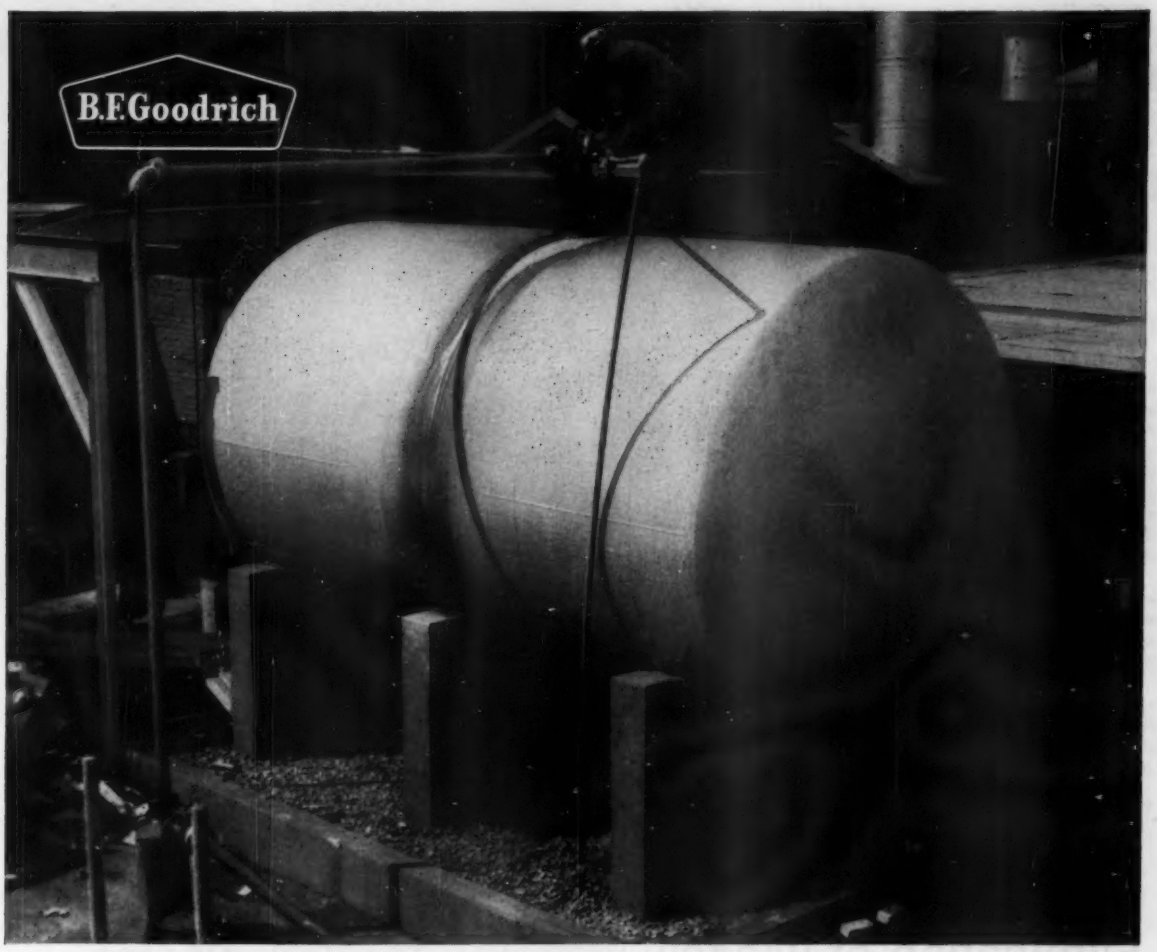

How Koroseal saves $12,000 a year for L. A. Darling Company

THE L. A. Darling Company of Bronson, Michigan manufactures plated racks and other display equipment for retail stores. Manual handling of muriatic acid in carboys (glass containers) was an expensive part of the manufacturing cost.

Then, three years ago, Darling installed a 12,000-gallon Koroseal-lined tank (pictured above) and a network of rigid Koroseal PVC piping. The tank permitted bulk purchase of acid, and the piping eliminated manual handling. Tangible savings have been in excess of $12,000 each year. And further savings have been realized through the elimination of broken carboys and the release of working capital previously tied up in deposits on carboys.

Koroseal rigid PVC by B.F. Goodrich has answered countless problems for alert manufacturers. Koroseal is unaffected by most alkalies and acids and is completely inert in the presence of oil, alcohol and salt solutions. It resists corrosion, has superior insulation qualities, will not support combustion and never needs to be painted.

Easy to install, Koroseal in various forms can be threaded, cut, welded or drilled. It is available in pipe, tubes, rods, valves and sheets. For information, just send in the coupon.

B.F.Goodrich Industrial Products Co.
Dept. PE-11, Marietta, Ohio

Please send me free booklets on:

☐ Rigid Koroseal Pipe
☐ Rigid Koroseal Sheet

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Company_____

City_____ Zone____ State_____

Koroseal—T. M. Reg. U. S. Pat. Off.

B.F.Goodrich *Koroseal rigid PVC products*

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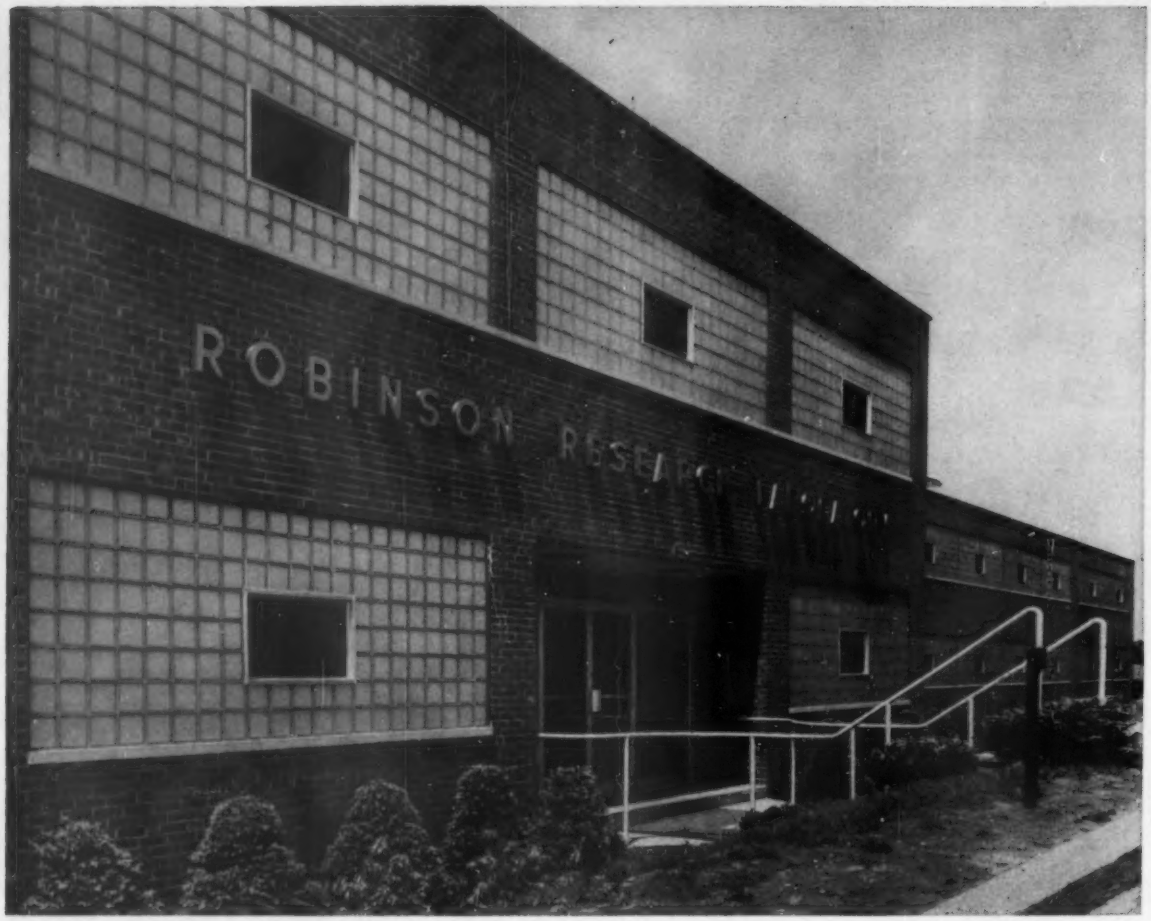
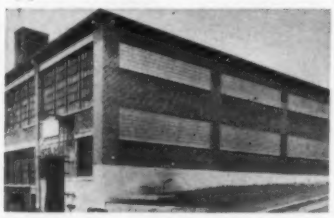


Elimination of window washing through use of PC Glass Blocks means large savings for lab...

"The elimination of window washing and reduced maintenance will result in substantial savings for us," states Mr. Frank Merwin, Plant Engineer at General Dynamics Corporation's Electric Boat Division, Groton, Conn.

These savings were gained from the use of PC Suntrol® Glass Blocks in 4800 square feet of window area in the Company's new three-story Robinson Research Laboratory. Mr. Merwin points to additional advantages that PC Glass Blocks have given Electric Boat. "Pressurized atmospheric control in laboratories, even-density lighting in shops, and a highly attractive outer appearance offer a practical solution to the natural lighting problem in industrial buildings."

So successful has Electric Boat been with Glass Blocks in this building they used a complete application in a recent addition to the research center, and in the modernization of an adjacent building (below). "And," relates Mr. Merwin, "Glass Block installation can be made so easily and rapidly I believe that we will find other applications for PC Glass Blocks in our various buildings."



Solve *your* window area problems with PC Glass Blocks. Send for our new booklet on savings in sash replacement. Pittsburgh Corning Corporation, Dept. PG-119, One Gateway Center, Pittsburgh 22, Pa. In Canada: 3333 Cavendish Blvd., Montreal, Quebec.

PITTSBURGH PC CORNING

For more facts circle 590 on Reply Card

Nothing takes ***a bigger beating than your floors . . .***

Only Masterplate floors take this terrific traffic

. . . 200,000 trips a year over aisles at Lincoln Electric

To withstand heavy fork-lift truck traffic—The Lincoln Electric Company's 30-acre plant uses MASTERPLATE floors in its material transfer aisle. MASTERPLATE "iron-clad" floors provide a thick, tough, malleable surface that can take this day-in, day-out beating.

With MASTERPLATE—Lincoln's high-volume production flow of welding machines and electrodes is not interrupted by costly downtime for floor repairs or replacement.

MASTERPLATE . . . and the on-the-job services of the Master Builders field service team . . . is your key to floors that last *4 to 8 times longer than the best plain concrete floor.* They pay for themselves again and again.

On any current or future floor projects, the local Master Builders field man will welcome discussing your requirements. Call him in. He's at your service. Write us for complete information.

The Master Builders Company, Cleveland 3, Ohio
Division of American-Marietta Company
The Master Builders Co., Ltd., Toronto 15, Ontario
International Department, New York 17, New York
Branch offices in all principal cities.

2-MINUTE TIME EXPOSURE—using "tracer lights"—shows typical continuous, heavy floor traffic pattern over MASTERPLATE floor at Lincoln Electric Co., Cleveland, Ohio—world's largest manufacturer of arc welding equipment.

MASTERPLATE provides a thick . . . tough . . . malleable "iron-clad" floor surface.
CONCRETE BASE SLAB FOR MASTERPLATE surface can be monolithic or two-course.

FOR FINISHING NEW CONCRETE FLOORS or re-surfacing old concrete floors—MASTERPLATE withstands impact . . . is oil resistant and virtually non-absorbent . . . easy to clean . . . resistant to many industrial corrosives and strong cleansers . . . *and outwears the best plain concrete floor 4 to 8 times according to tests by top independent testing authorities.*

MASTER BUILDERS®
MASTERPLATE*

*MASTERPLATE *is a registered trademark of The Master Builders Co. for its specially prepared, metallic aggregate for producing "iron-clad" concrete floors.*

For more facts circle 591 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 251-252. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

1—COATING SYSTEM gives two-fold corrosion control

Prufcoat Primastic is described as a protective coating combining rust-inhibitive primer properties with the chemical resistance of a catalyzed epoxy coating. According to manufacturer, this product, by affording both primer and topcoat corrosion-control qualities, performs functions formerly requiring use of two materials—and at a cost barely exceeding one cent per mil foot. It is said to withstand severe corrosive exposures, such as in process equipment in chemical, paper and petroleum industries. Only one brush or single-pass spray coat is required for a coating up to 10 dry mils in thickness, it is stated; a cross-pass spray coat yields 20 mil dry film. Prufcoat Laboratories, Inc.

2—INSTRUMENT measures and controls heat without contact

By means of infrared detection, the Thermodot Radiation Thermometer, Model TD-3, is said to automatically measure and control the temperature of moving or stationary objects without physical contact. Most significant application is expected to be in automation of production lines in metal fabricating, plastics, rubber, glass, paper and chemical industries. Basically, this radiation thermometer operates on the principle that an object emits thermal, or infrared, radiation as a function of its temperature; this radiation from an object is received by Thermodot, translated into a signal voltage, and amplified to a level sufficient to drive an indicator calibrated directly in temperature. Manufacturer says that sensitivity is high (7 deg at 2000 F) and instrument response is rapid and accurate, automatic and continuous. The lowest standard range is 400 F, the highest, 2000 F, although higher ranges can be had. Thermodot is claimed unaffected by ambient, or room, temperature variations from 20 to 120 F. Illustration shows rack-mounted indicating controller (left), independent power supply, and sealed optical head. Bulletin R-100 gives details. Radiation Electronics Co.

3—RUST PREVENTIVE for indoor storage of parts

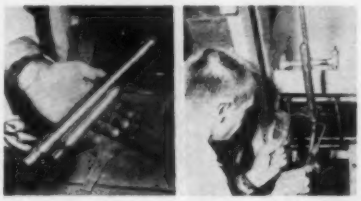
Rust Veto 377 is announced for protection of metal parts to be stored indoors for long periods. According to manufacturer, it is applicable to wet metal surfaces, water-displacing due to ability of preventive to force aside any moisture which might be present; creeps under surface moisture coating the metal with 0.0003-in. film to protect it against oxidation; and will not wipe off by handling. Treated parts need not be cleaned before lubricating. Test results are cited in which Rust Veto 377 withstood the 100 per cent humidity test for 30 days and 24 hr in a 20 per cent salt spray. E. F. Houghton & Co.

4—PORTABLE FIRE PUMP weighs only 50 lb

Featuring aluminum body construction, this positive displacement pump is both self-priming and operable in any position, company says, without loss in prime, and check valves are not required. Pump is designed to handle water with suspended abrasives at a suction lift of 28 ft while delivering 50 gpm at 100 psi discharge pressure. It is equipped with a two-cycle gasoline engine. Goodyear Pumps Inc.

5—PRE-FAB AIR CHAMBER for stopping water hammer

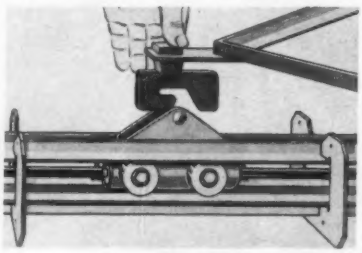
Tap/Trap is a one-piece prefabricated air chamber designed to prevent hammer and chatter in water systems. Ease of installation is stressed, because



Tap/Trap can be installed directly into each supply line in a system by making only one soldered joint. Tap/Trap is leakproof, manufacturer states, and standard lengths are 6 and 12 in. Overall diameter is 1 in., reduced at one end to ½ in. nominal for use in standard fittings. Wolverine Tube, Div., Calumet & Hecla, Inc.

6—TOW CONVEYOR hauls heavy, bulky molds, parts

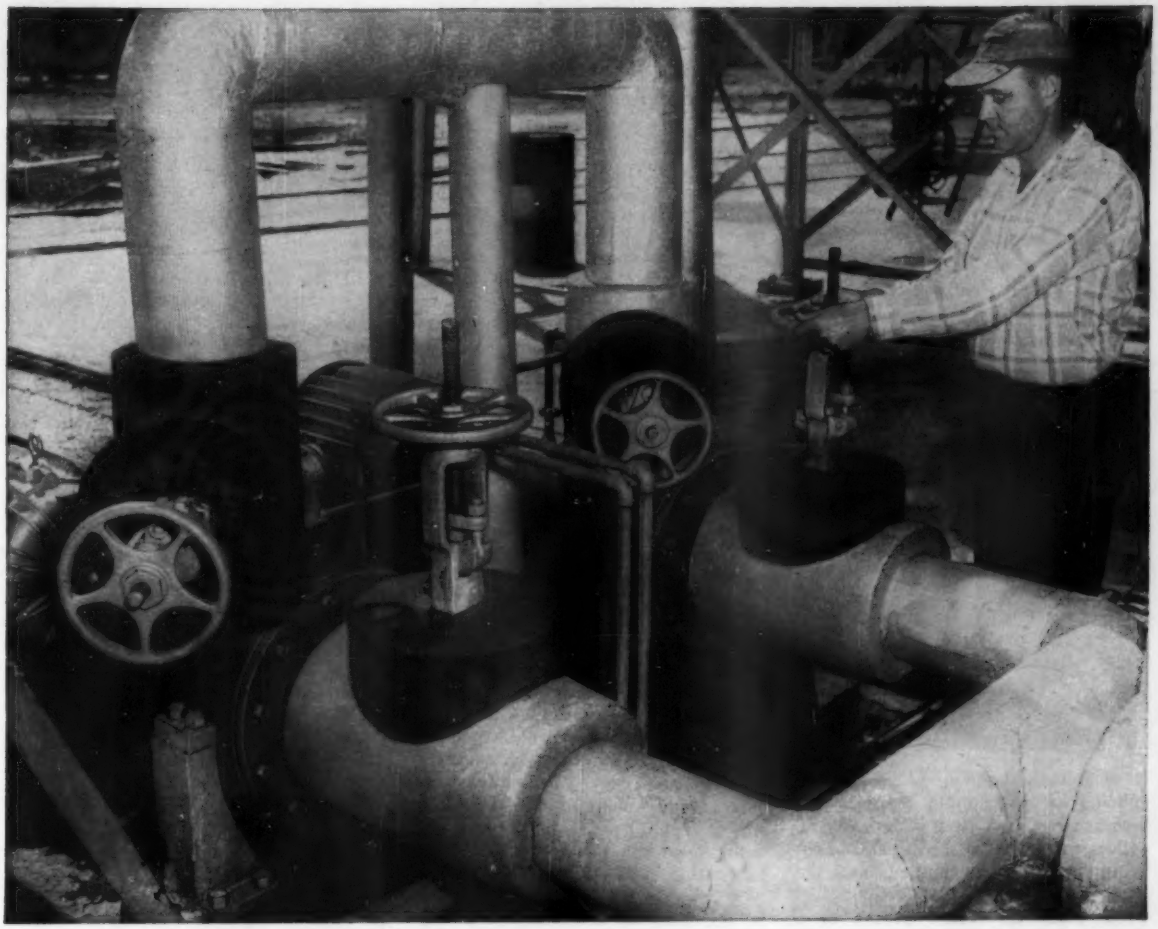
Gross weights of 1000 lb or more can be towed by the Chainless Conveyor, which can be installed in the floor, on the floor, or overhead, it is



announced. It is used with standard or special floor trucks. A tow-bar attached to the front axle of the truck is manually engaged in the trolley attachment. In-the-floor installations are covered by metal floor plates, except for a narrow slot in which the tow bar travels. Conveyor Div., The American MonoRail Co.

7—FILM-BACKED TAPE resists water and acids

Scotch Brand Paklon No. 681 is a transparent, film-backed tape designed to resist water, acids, alkalies and other strong solvents as well as wide temperature ranges. Made with transparent vinyl film backing, this clear



Holding tight on Dowtherm . . .
one of many jobs Crane Steel Gates do better

For more than four years these Crane 33XR 300-pound steel gate valves have given the Crosby Chemicals plant at Picayune, Miss., completely trouble-free service on 500 F Dowtherm. And they're still in perfect working order!

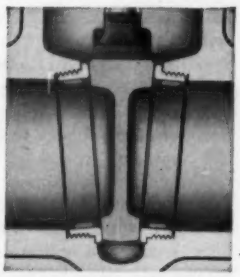
The hard-to-hold and non-lubricating characteristics of Dowtherm pose no problem for these valves. Seating materials—Crane Exelloy to No. 49 nickel alloy—insure the highest resistance to galling, wear and erosion.

A long-lasting, tight stem seal is made with special packing for Dowtherm—and Crane steel castings give the body and bonnet extra strength and rigidity for sustained smooth and positive operation under toughest working conditions.

On Dowtherm, steam, oil, gas or any service, you can rely on Crane steel gates for out-of-the-ordinary durability and maintenance savings. Their competitive price offers values you can't afford to overlook. Get full facts from your local Crane branch or wholesaler—or write to address below.

PROOF that Crane quality is better

Get "Valve Performance Facts"—a booklet of 32 case histories on Crane installations. Gives you many ideas for valve savings. Your copy free on request.



T-head disc-stem connection prevents lateral strains on stem. Close-fitting disc guides maintain accurate seating, reduce wear.

CRANE® VALVES & FITTINGS

PIPE • PLUMBING • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Illinois—Branches and Wholesalers Serving All Areas

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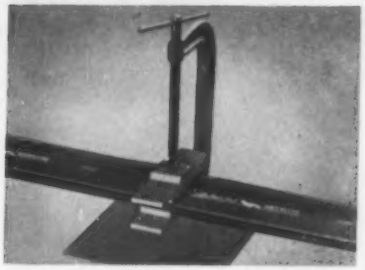
NEW PRODUCTS

(Begins on page 176)

tape is usable with most manual, semi-automatic and automatic dispensers and applicators. In both boxed and bulk form, it comes in widths from ¼ to 43 in., and lengths of 72 yd. Minnesota Mining and Mfg. Co.

8—RUBBER WATERSTOP splices in 6 min

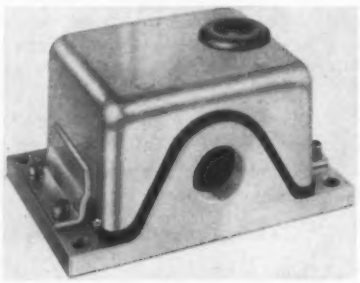
With Kwik-Seal Rubber Waterstop, strong, permanent splices can be made in just 6 min, it is announced—five times faster than with former methods. Instead of requiring heat-sealing or vulcanization, the Kwik-Seal splice



is chemically bonded. Only a small splicing kit and simple clamping device are required. Both waterstop and splice meet or exceed government requirements, it is claimed, and the waterstop retains a watertight seal even when movement occurs in a concrete joint. It is suggested for preventing seepage and leakage wherever concrete is used, as in power stations, pumping and water stations, tanks, wall base joints, building foundation walls. Gates Rubber Co.

9—INSTRUMENT senses destructive vibratory forces

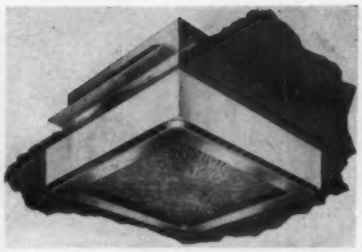
Vibraswitch 66 is a low-cost malfunction detector designed to sense destructive vibratory forces in rotating and reciprocating machinery. A vibration sensitive device, claimed capable of sensing immediately imbalance or high frequency vibration caused by failing bearings, broken blades or similar malfunctions, the Vibraswitch 66 may be wired to activate an alarm or cause a machine shut-down before damage occurs. In many instances when a malfunction occurs, low amplitude, high frequency "noise" is generated for several seconds or minutes prior to complete failure, according to manufacturer; with vibration of a failing bearing this "noise" is of low amplitude and would not be measurable with a displacement vibrometer.



Sensitivity of the Vibraswitch 66 is said to increase with frequency, making it equally suitable for sensing increases in amplitude at machinery operating speed or high frequency chatter, noise or shock associated with most malfunctions. Aeronautical and Instrument Div., Robertshaw-Fulton Controls Co.

10—LIGHTING FIXTURE for shallow plenum ceilings

Semi-Recessed-Shallow Brascolites are incandescent lighting fixtures designed to solve the shallow plenum ceiling problems. They are suggested for corridors, halls, lobbies, under ducts and pipes, wherever construction limits depth above finished ceiling. They require only 3- to 4-in. recessing depths—depending on unit selected. They come in 25 models in a full range of sizes and lens bottoms, and feature an Alzak aluminum reflector for optimum light control and



permanence. Surface boxes are finished in high-gloss, white enamel with contrasting Silvan flange and door. Edwin F. Guth Co.

11—TURBINE TYPE PUMPS with design improvements

Among design changes in the Apco Two-Stage Turbine Type Pumps is a revised shell housing which directs fluid from the first to the second stage impeller in a 180-deg crossover. By thus placing in opposition the resultant forces of first and second stages, the forces are equalized and a condition of balanced radial loads achieved, manufacturer explains; at the same time the arrangement eliminates shaft deflection. Removable channel rings provide for inexpensive replacement of eroded or corroded surfaces and wear is minimized by absence of metal-to-metal contact within pump channel—permitting handling of free-flowing or even non-lubricating fluids.

Within each series, capacities can be increased or decreased by changing channel rings and impeller. The pump can be converted to right-hand or left-hand operation in the field. Capacities range up to 150 gpm, pressures to 300 psi. Aurora Pump Div., The New York Air Brake Co.

12—THREAD TAPE to make pipe joints leakproof

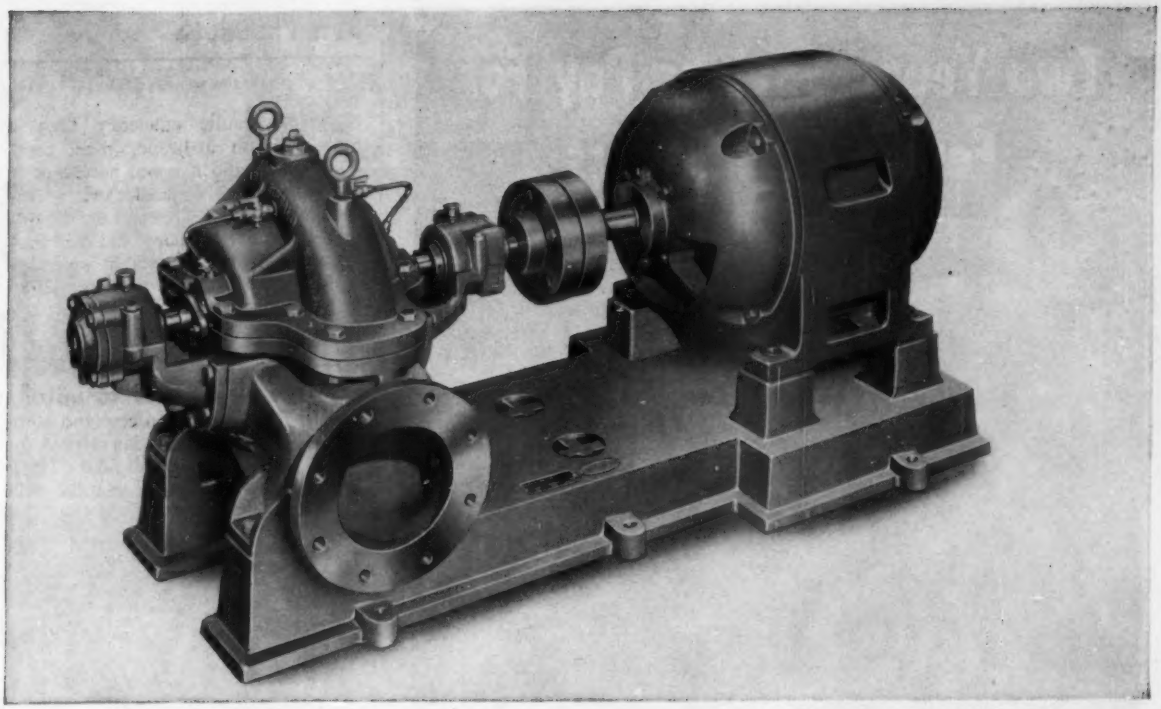
TTP Thread Tape is designed to provide leakproof threaded pipe joints for UPVC, stainless steel, aluminum and other corrosion-resistant piping. Made of Teflon the thread tape is claimed unaffected by corrosive materials, is self-lubricating and prevents joints freezing. Easy application, wrapping the tape around the threads one turn and overlapping the starting point slightly, speeds assembly and disassembly, manufacturer states. It is packaged in ½-in by 520-in rolls. Tube Turns Plastics, Inc.

13—STAINLESS STEEL PAINT reduces maintenance costs

No. 13448 is described as a multi-pigment stainless steel paint for exposed steel and aged galvanized iron. It contains stainless steel flakes (18 per cent chromium, 8 per cent nickel) and non-metallic pigments in a long oil alkyd vehicle. Manufacturer reports that it has passed 8 yr of tests in corrosive areas. Outstanding advantages claimed are: extreme durability in corrosive atmosphere, with a life expectancy of at least 12 yr; a dirt-shedding ultra-smooth surface; excellent brushing, hiding and package stability properties; minimum chalking; improved appearance upon aging. It is pointed out that while this paint costs about twice that of quality conventional paints, savings of 30 per cent or more can be anticipated due to its extended service life. Vita-Var Corp.

14—SPRAY NOZZLE features long life orifice

The Quik-Clamp is announced as a non-clogging spray nozzle for use wherever a pressure spray is needed. The nozzle, of cast manganese bronze to resist abrasive wear, has a machined taper on the outside diameter, so that it fits snugly into the hole which has been drilled and taper-reamed in the pipe. This nozzle has a



"Buffalo" Double Suction Pump for Clear Water Service

3-WAY ECONOMY
WITH THESE "BUFFALO" PUMPS

1. Minimum Maintenance Cost 2. Minimum of Costly Time-Outs
3. Minimum Service Costs

"Buffalo" Double Suction Pumps bring you these and many more economies because they combine superior hydraulic design with the finest quality workmanship and materials.

Lower maintenance cost and fewer expensive time-outs are the result of these "Buffalo" construction features: sturdy, machined casing with ample, simply-formed water passages — hydraulically balanced impellers assuring peak efficiency — renewable bronze wearing rings — heavy-duty ball bearings and shaft is high grade steel, machined all over, bronze covered, or solid monel metal or other alloy.

Lowest possible service costs are assured by the extra accessibility designed into these pumps. Horizontally-divided casing permits quick removal of the upper half. Thus interior parts can easily be inspected or removed without disturbing pipe connections.

Add to these economies peak efficiency and dependability and you have a pump that is unsurpassed for the most severe industrial clear water service.

For full information on the "Buffalo" Double Suction Pump, contact your nearby "Buffalo" engineering representative. Or write for Bulletin 955-S.

"Buffalo" PUMPS

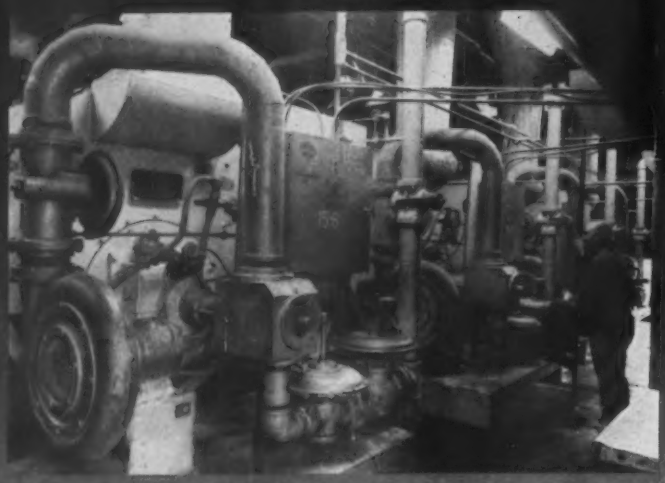
BUFFALO PUMPS
Division of Buffalo Forge Co.
166 MORTIMER • BUFFALO, N. Y.

Canada Pumps, Ltd., Kitchener, Ont. • Sales Representatives in all Principal Cities

A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID

For more facts circle 593 on Reply Card

Two Years' Savings Pay For Four Eclipse Boilers



Steady steam pressure improves vulcanizing process at STALWART

Substantial savings and improved operations make Stalwart Rubber Co., Bedford, Ohio, a satisfied Eclipse customer. Savings on these four 100-hp Eclipse gas-fired "Super-Matic" Scotch Steamboilerplants result from two factors: 1. High efficiency of the new units, and 2. substantial reduction in supervisory manpower.

Steady Steaming—High peak demands which previously resulted in a loss in pressure are no longer a problem. The new Eclipse units hold steam pressure constant, insuring higher production rates and more uniform products.

Cleaner, Smoother—The boiler room is cleaner and roomier since the new Eclipse Steamboilerplants went into service. Maximum flexibility and economy of operation are assured, no matter what the load. All four boilers are used in cold weather with two boilers carrying the load in warm weather when plant heating is not required.

Complete Data—Write for catalogs describing and illustrating 11 horizontal and 28 vertical models of Eclipse Steamboilerplants process-engineered to cut costs and boost operating efficiency.

Eclipse **ECLIPSE FUEL ENGINEERING CO.**
1198 Buchanan Street, Rockford, Illinois

For more facts circle 594 on Reply Card

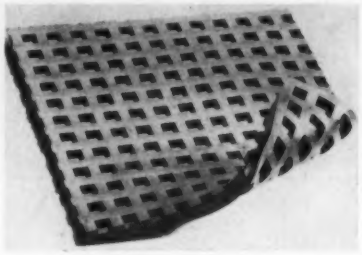
NEW PRODUCTS

(Begins on page 176)

higher hydraulic efficiency than a plain hole in a header pipe, company states, and it is not necessary to replace the entire header when corrosion or wear has opened up the orifice—a bronze U-clamp and cam lock nozzle in place. Nozzles fit pipe diameters of 2, 2½ and 3 in. Folder 2986 gives details. Link-Belt Co.

15—MACHINE MOUNTINGS are inexpensive to install

Fabcel Pads are low in cost and eliminate need for bolts, lag screws or cement under most machines, it is announced. The pad's suction cells



are designed to anchor machine to floor, control vibration, absorb shock, reduce noise and improve machine performance. It is noted that for best results pads should carry a load of about 50 psi except under impact machinery, where loading should be reduced to about 25 lb psi. Manufactured in 18-in squares, pads can be cut to shape as required. Fabreeka Products Co., Inc.

16—ALUMINUM FITTING for concrete mounting

Identified as Series GRC, this explosion-proof aluminum fitting for concrete mounting is available with blank cover for use as a splice box and hub cover suitable for fixture hanging. The fitting meets Code requirements, company states, and is available in conduit sizes from ½ to 1 in., in a variety of hub styles. Killark Electric Mfg. Co.

17—EXTERIOR PAINT can be applied in wet weather

Important advantage announced for Enterprise Latex Exterior Paint is that it can be used right over early morning dew or damp surface resulting from a rain. According to company, this paint "breathes" through microscopic pores to let underlying moisture escape without damage to paint film. Ease of application is also

3M Announces... **NEW** ...the miracle production cleaning material...

SCOTCH-BRITE®

Cleans better, cleans faster, costs less!

We'll prove it on your toughest cleaning jobs!

What do you have to clean?—raw stock, product parts, production equipment? We've tested and proved "SCOTCH-BRITE" Brand Cleaning Material for them all—for example, conveyors, tanks, bins, and vats, on flat metal, tubing, glass molds, printing plates, printed circuits, on metal/plastic combinations and many others.

You've never seen anything like new "SCOTCH-BRITE" material: a tough, springy, web-like pad of nylon filament with small working particles of abrasive mineral. Lightweight, long-wearing, easy to bend, fold or cut to shape. Let us show you how easily "SCOTCH-BRITE" loadings can replace your present power brushes, on almost any fixed or portable hand or automatic cleaning equipment!

We'll prove it with your present equipment!

See for yourself how "SCOTCH-BRITE" Brand Cleaning Material outcleans and outlasts wire brushes, fiber brushes, steel or other wools—and at lower initial cost, too! It wipes away dirt, grease, wax, stains, scale or oxides; follows complex contours that bristles can't reach—and rinses clean without rusting or staining!

We'll prove it—at no obligation to you!

MINNESOTA MINING AND MANUFACTURING COMPANY

3M COMPANY

...WHERE RESEARCH IS THE KEY TO TOMORROW

3M Co., 900 Bush Ave.,
St. Paul 6, Minn., Dept. ABQ-119

Please call to arrange a free demonstration of "SCOTCH-BRITE" material on our cleaning operations.

NAME_____

POSITION_____

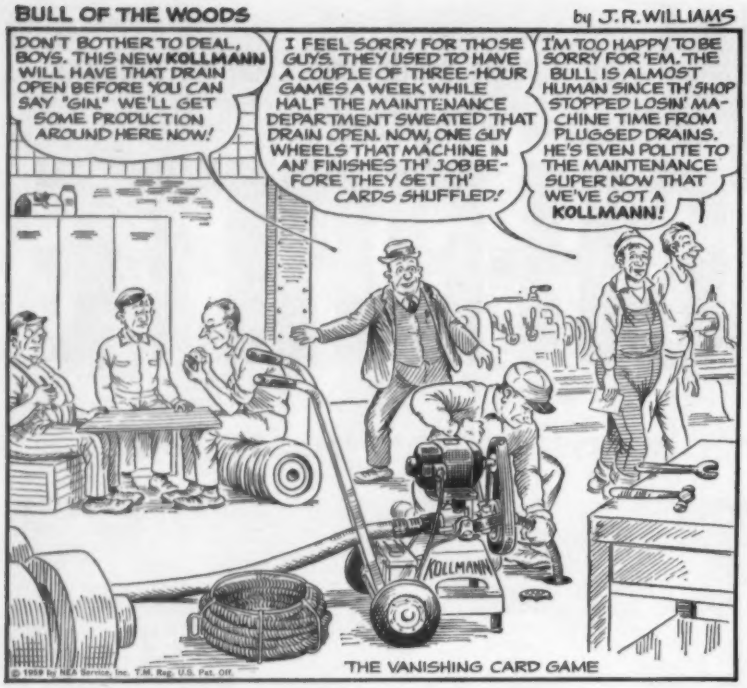
COMPANY_____

ADDRESS_____

CITY_____ ZONE___ STATE_____

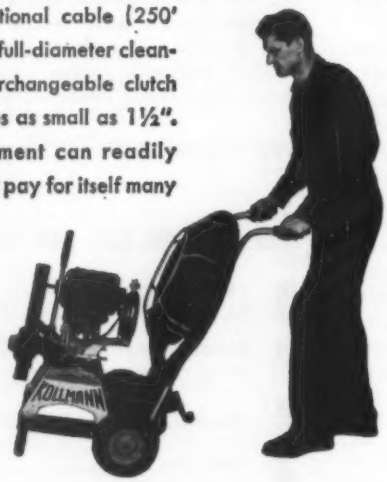
The term "SCOTCH-BRITE" is a registered trademark of 3M Co., St. Paul 6, Minn. Export: 99 Park Ave., New York 16. Canada: London, Ontario

For more facts circle 595 on Reply Card


BULL OF THE WOODS
by J.R.WILLIAMS
DON'T BOTHER TO DEAL, BOYS. THIS NEW KOLLMANN WILL HAVE THAT DRAIN OPEN BEFORE YOU CAN SAY "GIN." WE'LL GET SOME PRODUCTION AROUND HERE NOW!
I FEEL SORRY FOR THOSE GUYS. THEY USED TO HAVE A COUPLE OF THREE-HOUR GAMES A WEEK WHILE HALF THE MAINTENANCE DEPARTMENT SWEATED THAT DRAIN OPEN. NOW, ONE GUY WHEELS THAT MACHINE IN AN' FINISHES TH' JOB BEFORE THEY GET TH' CARDS SHUFFLED!
I'M TOO HAPPY TO BE SORRY FOR 'EM. THE BULL IS ALMOST HUMAN SINCE TH' SHOP STOPPED LOSIN' MACHINE TIME FROM PLUGGED DRAINS. HE'S EVEN POLITE TO THE MAINTENANCE SUPER NOW THAT WE'VE GOT A KOLLMANN!
KOLLMANN
© 1958 by NEA Service, Inc. T.M. Reg. U.S. Pat. Off.
THE VANISHING CARD GAME

YES, THE KOLLMANN "500" CLEARS *Any* STOPPAGE QUICKLY...THOROUGHLY...

● Designed for industrial use, the "500" makes fast work of stubborn flow line stoppages, eliminates trouble and "down time"... and anyone in the maintenance crew can operate it. The dolly-mounted "500" handles up to 150' of sectional cable (250' with larger power units) for full-diameter cleaning of lines 3" to 10". Interchangeable clutch jaws quickly adapt it to lines as small as 1½". *Every* maintenance department can readily justify this machine... it will pay for itself many times over.



See the full Kollmann line at your distributor, or write for literature.

KOLLMANN
MANUFACTURING COMPANY
Erie, Pennsylvania • Phone: Erie 99-1102
Leading Designer and Manufacturer of Drain Cleaning Equipment Since **1936**

For more facts circle 596 on Reply Card

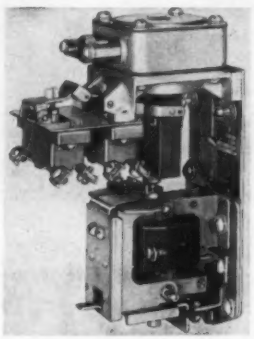
NEW PRODUCTS

(Begins on page 176)

stressed. Because of the latex base, there is said to be practically no pull on brush drag with this paint, so that a larger brush can be used and surfaces covered faster with less effort. Manufacturer says this paint dries to the touch within 30 min, and lap marks do not show. It may be used on wood, brick, siding, shingles, stucco and cement. Thinners aren't required and brushes and rollers used to apply it can be washed in soap and water. Enterprise Paint Mfg. Co.

18—TIMING RELAY with two snap switches

This adjustable-range pneumatic timing relay has two normally open and two normally closed timed contacts. Two single-pole, double-throw snap switches are used for timing contacts,



and each can be separately adjusted to provide a definite timing sequence; thus, one snap switch can be set to operate before the other, company states. Up to two instantaneous single-pole double-throw interlocks can be furnished. Timing range is adjustable from 0.2 sec to 3 min, with a repeat given as ± 10 per cent. It is available for a-c or d-c operation, and requires no more panel space than the single snap switch model. Bulletin 9050-7 gives details. Square D Co.

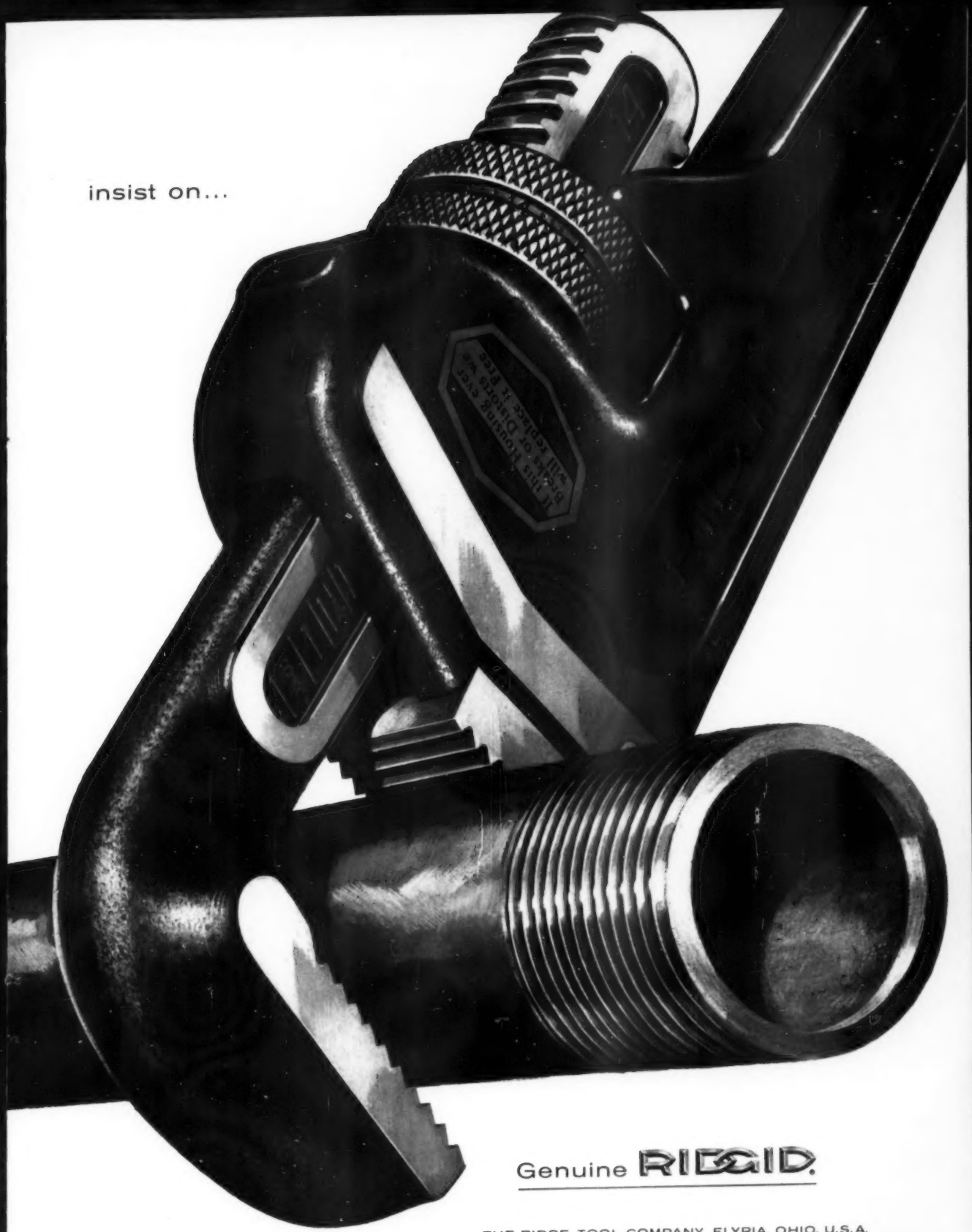
19—HYDRAULIC SETS facilitate machine maintenance

With these three hydraulic maintenance sets, removal and installation of gears, bearings, bearing cups, wheels, sheaves, shafts, couplings, sprockets, pulleys etc, can be done efficiently and without damage to parts, it is announced. The sets are claimed adaptable to all types of machines from fractional horsepower motors through light machine tools and heavy industrial machinery. Most

(Continued on page 186)

For more facts circle 597 on Reply Card →

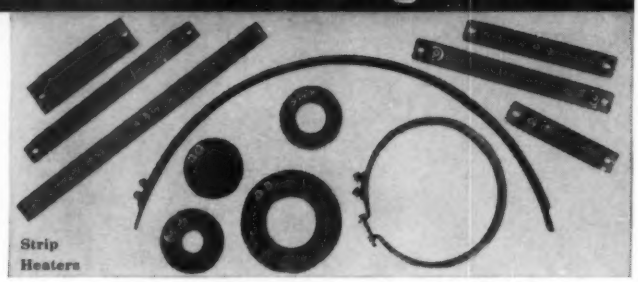
insist on...



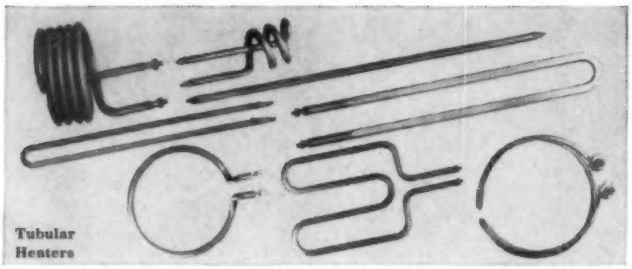
Genuine RIDGID.

THE RIDGE TOOL COMPANY, ELYRIA, OHIO, U.S.A.

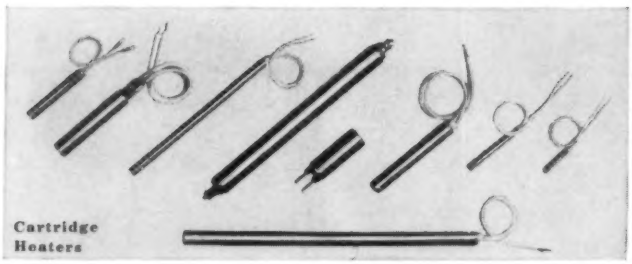
Call your CHROMALOX Man for the heating answers



Strip Heaters



Tubular Heaters



Cartridge Heaters

These 3 basic CHROMALOX heaters provide answers to just about any heating problem

Strip Heaters . . . that quickly and easily bolt or clamp to platens, dies, kettles, tanks, pipes, rolls, drums, ovens and air ducts. Lengths from 4 to 96 inches, widths from ¾ to 2½ inches, with cross section curving or lengthwise bending. Available with brazed-on fins.

Tubular Heaters . . . that clamp on, fit into machined grooves, cast into metals, immerse in liquids, install in ovens and ducts. Straight lengths or factory-formed to nearly any contour. Lengths from 6 inches to 30 feet. Triangular or round cross section. Available with brazed-on fins.

Cartridge Heaters . . . that smoothly fit standard drilled holes in dies, platens, molds, extrusion and injection barrels. Special leads available for protection against flexing action, abrasion, moisture or vapors. Diameters from ⅜ to 1¹⁹⁄₆₄ inches, lengths from 1⅝ to 25⅜ inches.

Versatile Chromalox electric heaters are available in sheath materials and wattages to match almost any application to 1100°F. Easy to install, they are fast, clean, safe and economical.

Your Chromalox Man can help you determine the one that best answers your specific problem. He's backed by the world's largest factory stock of industrial heaters, ready for immediate shipment. Why not give him a call. You'll find his phone number listed at the right.

Our new Catalog 60 provides detailed product information and suggests numerous applications for the complete line of Chromalox electric heaters for industry. If you have not yet received a copy, please let us know. 1801

For more facts circle 598 on Reply Card

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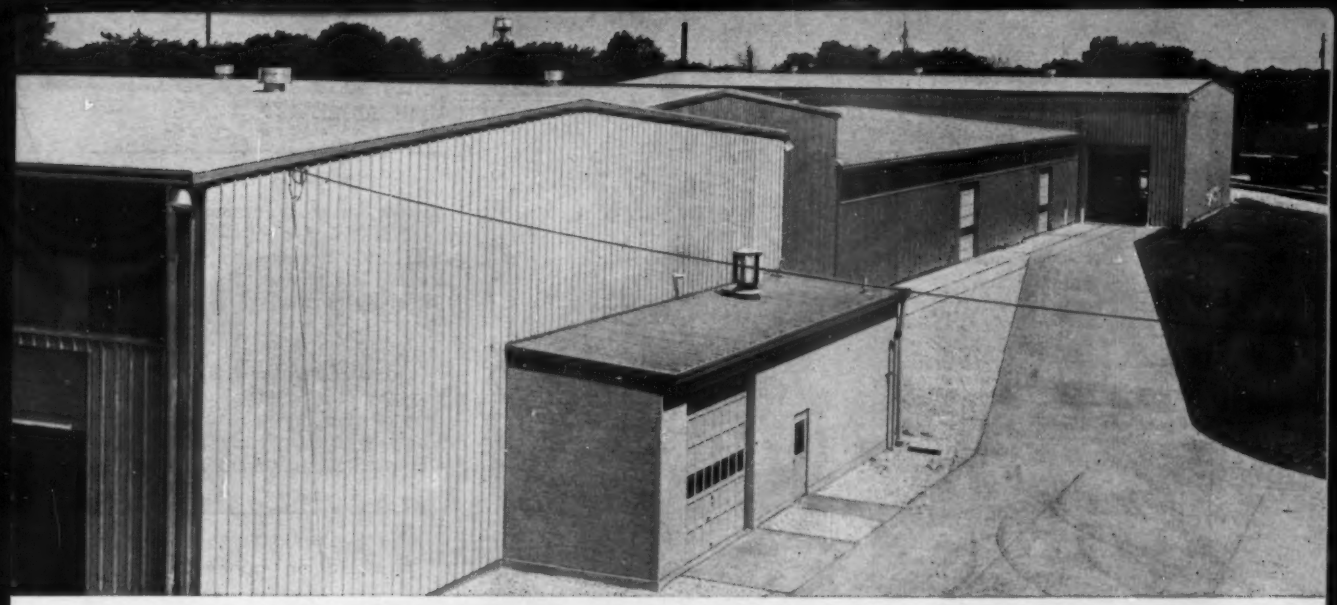
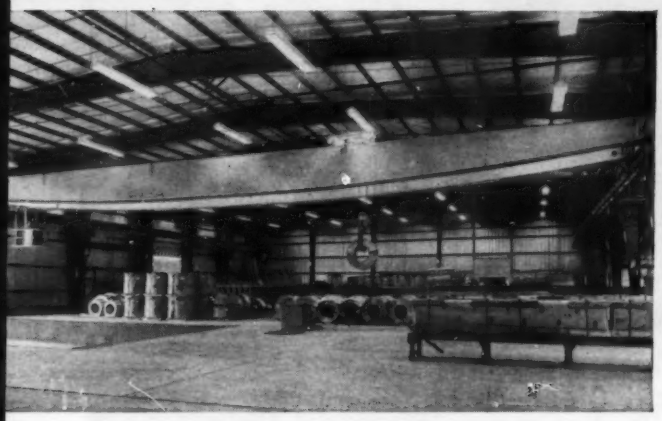
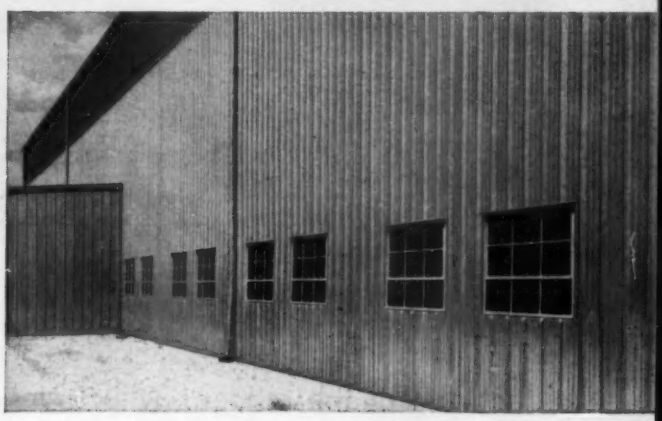
INDUSTRIAL · COMMERCIAL · RESIDENTIAL
EDWIN L. WIEGAND COMPANY
7553 THOMAS BLVD., PITTSBURGH 8, PA.





Spacious, clear-span interiors



Beautiful new Butlerib panels

This new factory makes Butler factory buildings an even better buy

Here's one of the newest, most modern metal fabricating plants in the country. It's Butler's new factory in Galesburg, Illinois, built to produce new Butlerib™ metal cover panels for the Butler system of building. A unique combination of deep and shallow corrugations makes Butlerib panels the strongest, most rigid and most weathertight cover ever offered on Butler industrial and commercial buildings. It's a cover that's as beautiful as it is practical.

And, thanks to the streamlined efficiency of this new factory with its high-speed roll-forming equipment, Butler offers this new, superior cover as standard material on Butler buildings—at no increase in price.

This new Butler factory is also a good example of the design latitude the Butler system of building permits. Butler engineers developed the work flow pattern first. Then, with standard Butler components, they designed the building to enclose the flow pattern.

Butler Low-Profile (LRF) rigid frames form the structural system. These frames span areas up to 120 feet, yet have a low, modern 1-in-12 roof pitch. Butlerib walls and roof form a cover that gives maximum protection, yet requires only a minimum of maintenance.

If you're planning industrial construction, get the full story on the Butler system of building today. It's the pre-engineered system of building that saves you time and money, but doesn't limit plant design. And, with new Butlerib panels, it's an even better way to build . . . still the lowest-cost way to build well.

For full details, contact your Butler Builder. Ask him about Butler financing, too. He's listed in the Yellow Pages under "Buildings" or "Steel Buildings." Or write direct.

BUTLER

BUTLER MANUFACTURING COMPANY 7529 East 13th Street, Kansas City 26, Missouri

Manufacturers of Metal Buildings • Equipment for Farming, Oil Transportation, Outdoor Advertising • Contract Manufacturing

Sales offices in Los Angeles and Richmond, Calif. • Houston, Tex. • Birmingham, Ala. • Kansas City, Mo. • Minneapolis, Minn. • Chicago, Ill. Detroit, Mich. • Cleveland, Ohio • Pittsburgh, Pa. • New York City and Syracuse, N.Y. • Boston, Mass. • Washington, D.C. • Burlington, Ont., Can.

For more facts circle 599 on Reply Card

NEW dry-acid cleaners are concentrated, easier to handle, require less storage space. One 100-lb. drum, for example, occupies only 1.9 cubic ft. of storage space – is more than equivalent to a 192-lb. carboy of 18° Be' HCl.

OLD cleaning method required stocking bulky, returnable carboys of liquid acids. Special precautions are necessary in shipping and handling. And a 192-lb. carboy of 18° Be'hydrochloric acid occupies 5.6 cubic ft. of valuable storage space.

✓ Lower storage cost

Just one of the reasons why **Dry Acid Cleaners** based on **Du Pont Sulfamic Acid** are gaining wide favor for industrial equipment cleaning: ✓ Safer to handle ✓ Easy to use ✓ No hazardous fumes ✓ Powerful descaling action ✓ Less corrosive ✓ Lower handling and shipping costs.

CLEANERS BASED ON SULFAMIC ACID REMOVE SCALE AND DEPOSITS FROM:
Steam Boilers, Condensers, Heat Exchangers, Piping.

DU PONT **Sulfamic Acid**

BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

Please send me:

☐ Free booklet about dry-acid cleaners based on Du Pont Sulfamic Acid

☐ Names of formulators who offer these cleaning compounds

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Rm. N-2543PE
Wilmington 98, Delaware

Name_____

Firm_____ Title_____

Address_____

City_____ State_____

For more facts circle 600 on Reply Card

NEW PRODUCTS

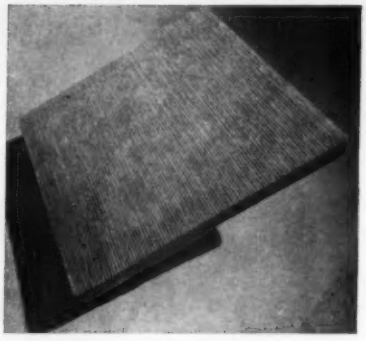
(Begins on page 176)

popular for small and medium equipment is No. Y-1700, which contains a 17½-ton capacity ram, pump, pullers and attachments. The No. Y-1730 Set offers all of the 17½-ton components, plus a 30-ton ram and attachments. The big 50-ton capacity set, No. Y-1735, designed to handle 99 per cent of all pulling jobs, incorporates all components of the other two sets plus a 50-ton ram, special pump and attachments. Owatonna Tool Co.

Use the Reader Service Cards provided on pages 251-252 to ask for more information on the products. Circle item numbers of the products in which you are interested.

20—FORM BOARD features glass cloth facing

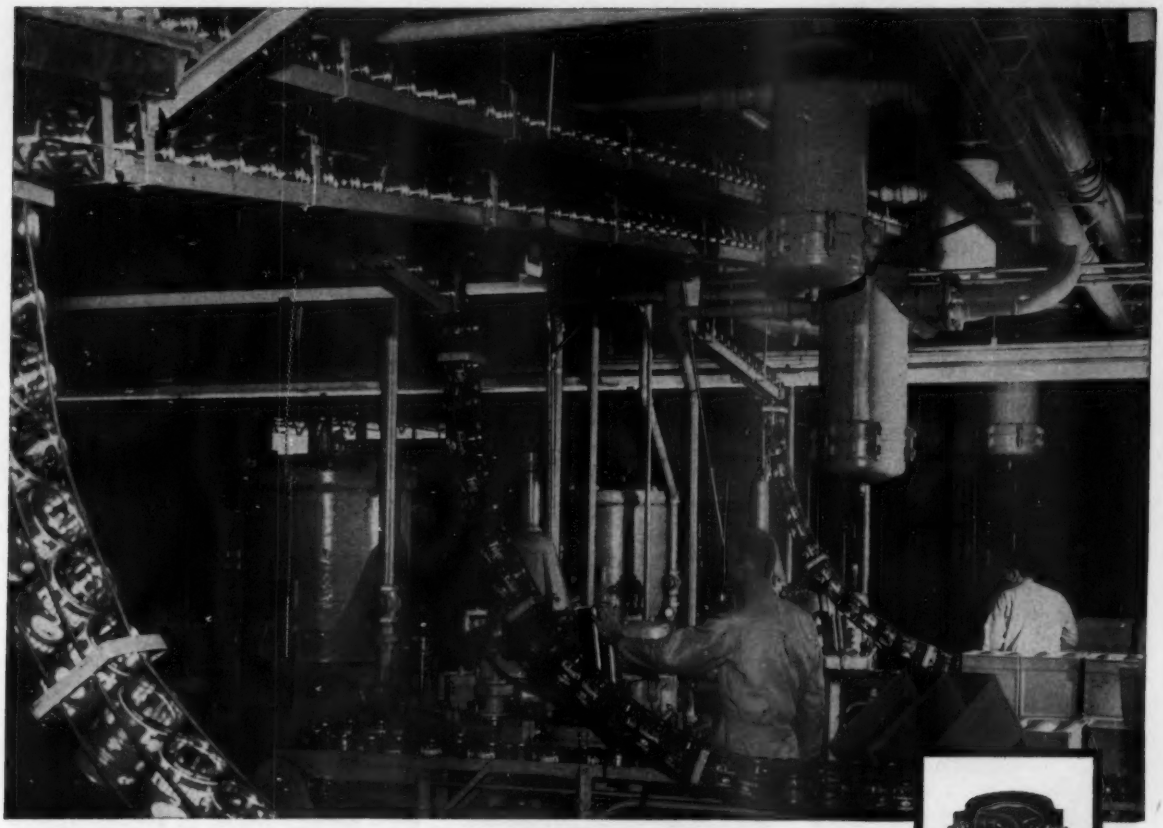
This glass cloth faced form board is said to offer many advantages as a permanent form in construction of poured-in-place gypsum and light-



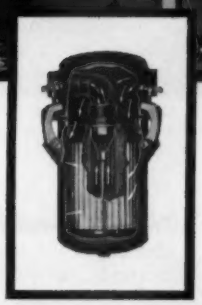
weight aggregate concrete roof decks. It is particularly useful for low ceiling areas, company says, and multipurpose rooms open to ceiling damage; and offers outstanding thermal and acoustical qualities, fire safety, durability, and ease of handling and installation. The board has a pleasing surface texture, as shown, and comes in a standard 32-by-48 size, 1-in. thick. Owens-Corning Fiberglas Corp.

21—DUST COLLECTOR is self-cleaning unit

No moving parts, constant air flow and pressure drop, and automatic filter tube cleaning are among features announced for this compact dust collector. Being cylindrical, it has no corners to hold dust. In operation, the



STAYNEW FILTERS KEEP TROUBLE FROM BREWING AT FOLGER'S COFFEE PLANT



Model CVH Staynew Filter used at Folger's. Filter inserts consist of Feltex 12 wool felt, are cleaned only once weekly.

At Folger's multi-million dollar plant in Los Angeles, Staynew Pipeline Filters play a vital role in vacuum packing—in fact, they literally keep trouble from brewing.

In vacuum packing shutdowns for pump repair cannot be tolerated. Pumps "suck" air from coffee cans before they are sealed for shipment. When this air is drawn off, some coffee particles are bound to come with it. At Folger's, Staynew Filters protect the vacuum pumps by preventing these particles from getting to them. Located between the production line and the pumps, Staynew Filters first mechanically clean the incoming air by forcing heavier particles into the base of the housing. Then, flowing through the Radial Fin Filtering Insert, any remaining airborne materials are removed, leaving only clean air to pass to the pump. Mechanical separation before filtering reduces the load on the filtering element. Low velocity with unusually low resistance to flow results. This keeps line pressures at the proper operating level and offers a tremendous saving in horsepower.

Designed to eliminate frequent cleaning, Staynew Filters contain a liberal space in the bottom housing for large particle accumulation — this can be drained off without shutdown. The Radial Fin construction of the filtering element provides an extremely big active filtering area—this means a greater amount of filtering over a longer period of time. For inspection and cleaning, large swing bolts permit removal of the lower housing, offering easy access to the filter interior without breaking pipe connections.

Assuring sustained, trouble-free operation of pumps at high load factors, Staynew Pipeline Filters have been successful in the packing of millions of pounds of coffee annually at Folger's. They've also gained wide acceptance in the processing of canned meat and other foods, and on vacuum degassing and high vacuum metal processing systems, to name a few. There's a Staynew Filter for every job—find out how you can save time and money on your particular application—consult a Dollinger representative, or write for Bulletin 200. Dollinger Corporation, 55 Centre Park, Rochester 3, N. Y.

MR. PROTECTOMOTOR U.S. PAT. OFF.

STAYNEW FILTERS

DOLLINGER

SPECIALIZING IN DRY TYPE FILTERS FOR OVER 35 YEARS

LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS HIGH PRESSURE FILTERS • AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS

For more facts circle 601 on Reply Card

FLEXIBLE PRODUCTION LINES with MOBILE MACHINERY!

Today's competitive market
challenges the manufacturer to adapt quickly to new cost-reducing methods and systems — new and improved processing techniques.

Patented Leveling Feature

One important answer to this challenge is plant flexibility through machine mobility.

Modern production facilities
no longer bolt their machinery to the floor. Machines on Barry Leveling Mounts are mobile — regardless of size, weight, or type of operation. Easily moved, and installed without drilling, lagging, or shimming, these mobile machines are readily adaptable to changing production requirements.

Proof! One manufacturer moved 86 heavy-duty machine tools in a five-week period without interrupting production. Ask for detailed report on "Resilient Mountings as Applied to Production Machinery".

BARRY CONTROLS
INCORPORATED
700 PLEASANT ST., WATERTOWN 72, MASSACHUSETTS

For more facts circle 602 on Reply Card

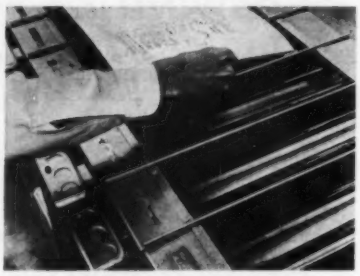
NEW PRODUCTS

(Begins on page 176)

unit receives dust-laden air through a tangential cyclone ring, and heavier materials are dropped immediately to prevent overloading of tubes, manufacturer states. Lighter materials are collected on the outside of the tubes. As the accumulation builds up, these tubes are intermittently flexed taut by sharp bursts of compressed air in a continuous series of sequences. This shake-off action, adjustable as to duration and interval, cleanses the filter tubes throughout operation. This collector is suggested for use in coal, chemical, cement, gypsum, steel and other heavy industries. It can be suspended from ceiling or floor mounted. Six standard sizes cover 2000 to 12,000 cfm. Flex-Kleen Corp.

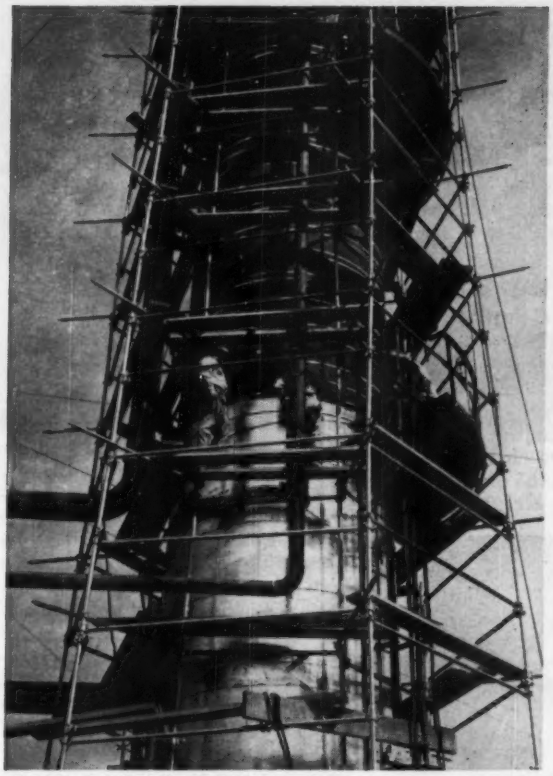
22—RADIANT HEATER for quick warm up, cool off

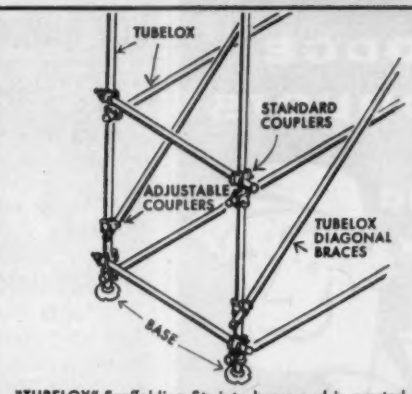
The Vycor Radiant Heater, a tubular unit, reaches heating capacity of 800 to 850 F within 3 min, manufacturer announces, and since it also cools rapidly, it requires no complex equipment for diverting heat after shutdown. For horizontal mounting above or below process line, this heater produces an average of 20 w per square inch of working surface. It is designed to emit long wave infrared rays from wire coils in tubes



of 96 per cent silica glass, with heat absorbed uniformly regardless of product color. The glass tubing is resistant to heat, heat shock and corrosion, it is noted, and a triple reflector system directs 85 to 90 per cent of available radiation onto the work. A strip of platinum, fire bonded to one side of the Vycor tube, serves to literally bounce heat toward the product.

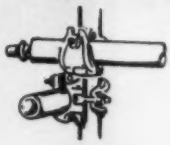
The housing—two layers of aluminized steel with Fiberglas insulation between—provides additional reflection. Engineered for low cost installation, the unit is equipped with junction box, leads and mounting hangers. Units can be interlocked in parallel series, as shown, and require no mid-





"TUBELOX" Scaffolding fits into bases and is erected quickly with standard and adjustable couplers for vertical, horizontal, and diagonal members. Any size, shape or height scaffold can be made with *only 4 basic parts*, all galvanized.

"TUBELOX" members 6′ to 20′ long, 2″ and 2½″ o.d., which interlock for continuous lengths.



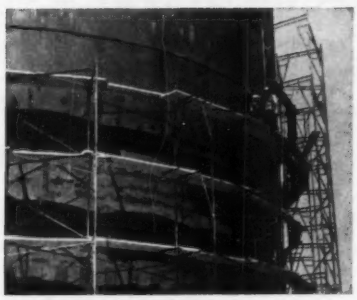
STANDARD COUPLERS for right angle connections

ADJUSTABLE COUPLERS for diagonal connections

BASES to spread loads on first vertical members

ONLY 4 BASIC PARTS—"TubeLox"® tube and coupler Steel Scaffolding is a versatile, all-purpose scaffolding. It builds up and dismantles rapidly because it uses only four basic parts (see drawing, right). It is unlimited in its ability to conform to any shape, size, height or length of job—towers, tanks, chimneys, buildings, piping, steelwork, either interior or exterior. Wherever irregular forms make access difficult, "TubeLox" Scaffolding quickly adjusts by means of tube lengths and adjustable couplers to provide as many work levels as desired. "Gold Medal"® Featherweight Stages give quick, multi-level working platforms on this strong, sturdy, safe scaffolding.

Scaffolding Methods . . . for Plant Maintenance



"TROUBLE SAVER"® SECTIONAL STEEL SCAFFOLDING permits varied use as scaffolding for large structures, as well as rolling or stationary units assembled to provide quick access to low heights.

NEW PS CO. SAFETY LADDERS 20″ and 30″ widths, from 1 to 5 steps without handrails (shown); 2 to 12 steps with handrails. Easy-to-roll, self-locking casters. Flared bottom design gives maximum stability. Steel angle reinforces all steps. *Write for Bulletin SL-1.*

"GOLD MEDAL" PLATFORM STEP-LADDERS are the safest made, 3′ to 20′ sizes. Extension Ladders, sizes 16′ to 60′. Single Ladders up to 26′. Also lightweight aluminum ladders for all work. Many safety features.

Write for Bulletin G205RR

Complete scaffolding equipment and engineering service offered through nation-wide sales offices or representatives. Look under Patent Scaffolding in the Yellow Pages for your nearest source.

SALES **RENTALS**

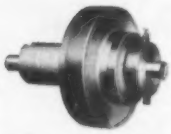
FOR GREATER SAFETY...EFFICIENCY...ECONOMY

THE PATENT SCAFFOLDING CO., Inc.

38-21 12th Street, Dept. PE, Long Island City 1, N. Y.

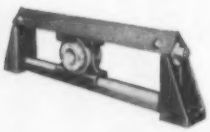
1550 Dayton Street, Chicago 22, Illinois • West Coast: 6931 Stanford Ave., Los Angeles 1, Calif.
In Canada: 355 Dufferin St., Toronto • *Branches in all Principal Cities*

For more facts circle 603 on Reply Card



DIAMOND D CLUTCHES
Rugged! Compact! Completely enclosed!

TAPER-LOCK STEEL CONVEYOR PULLEYS
Maximum strength with minimum weight!



DODGE TAKE-UPS
Complete range of stock models, sizes.

•

Write for Bulletins!

- ✓ Diamond D Clutches—technical data.
- ✓ Conveyor Pulleys—technical data.
- ✓ Take-Ups—Roller, Ball, Babbitted.

DODGE MANUFACTURING CORPORATION
2700 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

For more facts circle 604 on Reply Card

NEW PRODUCTS

(Begins on page 176)

supports. This heater is said to cause less than 10 per cent power surge when turned on, so that switches require rating no higher than that of the heater. Corning Glass Works.

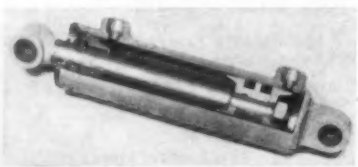
23—FIREBRICK is stronger, affords better insulation

B&W K-20 and K-23 are announced as stronger and improved insulating firebrick, lighter in weight and lower in thermal conductivity than otherwise available. Company says that mechanical strength has been increased more than 65 per cent for B&W K-20, 50 per cent for B&W K-

23, an increase enabling use in wider range of applications and fitting with hangers or pins without damage. Better mortar bonding and resistance to gas erosion and superior resistance to direct flame exposure are also claimed. B&W has an average weight of 1.70 lb per 9 in. straight, while the B&W K-23 9-in. straight averages 1.85 lb—reportedly the only 2300 F use limit brick under 2 lb. Both can be tailor-cut, drilled or shaped as necessary; they can also be cut and shaped on the job. Refractories Div., The Babcock & Wilcox Co.

24—HYDRAULIC CYLINDERS with cushioning choice

Available in 1500- and 3000-psi rating, in sizes from 1½- through 5-in. bore diameters, these hydraulic cylinders are offered in both double and



single acting styles. Features announced include fixed cushioning at no additional cost, shorter mounting lengths, larger bearing areas for longer life, bronze rod bearing lubricated from within, wider spread between bearings to provide better rod stability when extended, non-cushioned or cushioned, the cushions being either fixed or adjustable. Various options are offered in port thread sizes and types, end extensions, types of mountings, and port location. Lanseair Development Corp.

25—ROLLER DIE CUTTER is smaller sized unit

Model 11103, a smaller version of this company's big automatic roller die cutter, has an automatic roll feed device and discharge conveyor takeaway. Its pinch bar feed accommodates a roll of material 40 in. wide and the die cutter bed is 39 in. long. Feeding mechanism stroke can be regulated from 6 to 39 in. Most material die cut on this unit is flexible, according to manufacturer, and for that reason the pinch bar feed has been designed especially to push, not pull, the material onto the bed of the die cutter to eliminate possibility of stretching material during the die cutting process. Company reports that on one test run, die cutting foam rubber insoles for play shoes, the machine cycled 10 times per minute. Falls Engineering and Machine Co.

26—HANDY TOOL for link coupling, uncoupling

The Veelos Tool is designed for safe, easy coupling and uncoupling of link Vo-belts. Made of heavy gage steel, the

handles of the tool are cadmium plated for added durability. When the handles are squeezed, the points grip and open the hole in the link. Manheim Mfg. & Belting Co.

27—PIPE JOINT COMPOUND in miniature plastic tubes

Plastic Lead Seal, a pipe joint and thread sealing compound, now comes in plastic tubes containing 1 oz of the compound—enough for normal installation and conversion kit needs. The tubes are compact and pliable, can be fitted into tight spots. Accord-

DODGE PILLOW BLOCKS

WITH TIMKEN BEARINGS

America's super-quality line—with a 35 year record of keeping performance *up* and costs *down!* Five types—to fit practically any service condition. All assembled, adjusted, lubricated and *sealed* at the factory for precision performance—long life—dependability.

SPECIAL DUTY TYPE →

- Designed for extreme precision and high load capacities.
- Fully self-aligning.
- Special Duplex Timken Roller Bearing with tapered bore.
- Split tapered sleeve with straight cylindrical bore extends through entire length of housing.
- Easy to mount or demount. Adapter nut (or collar) clamps adapter sleeve to shaft with extreme firmness.
- Automotive type piston ring seals. Bearing is sealed both on and off the shaft.
- Rugged semisteel outer housing.
- Elongated bolt holes provide for lateral adjustment.
- Special dust cap protects lubrication fitting.
- Shaft sizes 1⅞" to 8". Ask your local Dodge Distributor—or write us for Bulletin A670 giving complete technical data on America's most complete line of mounted bearings.

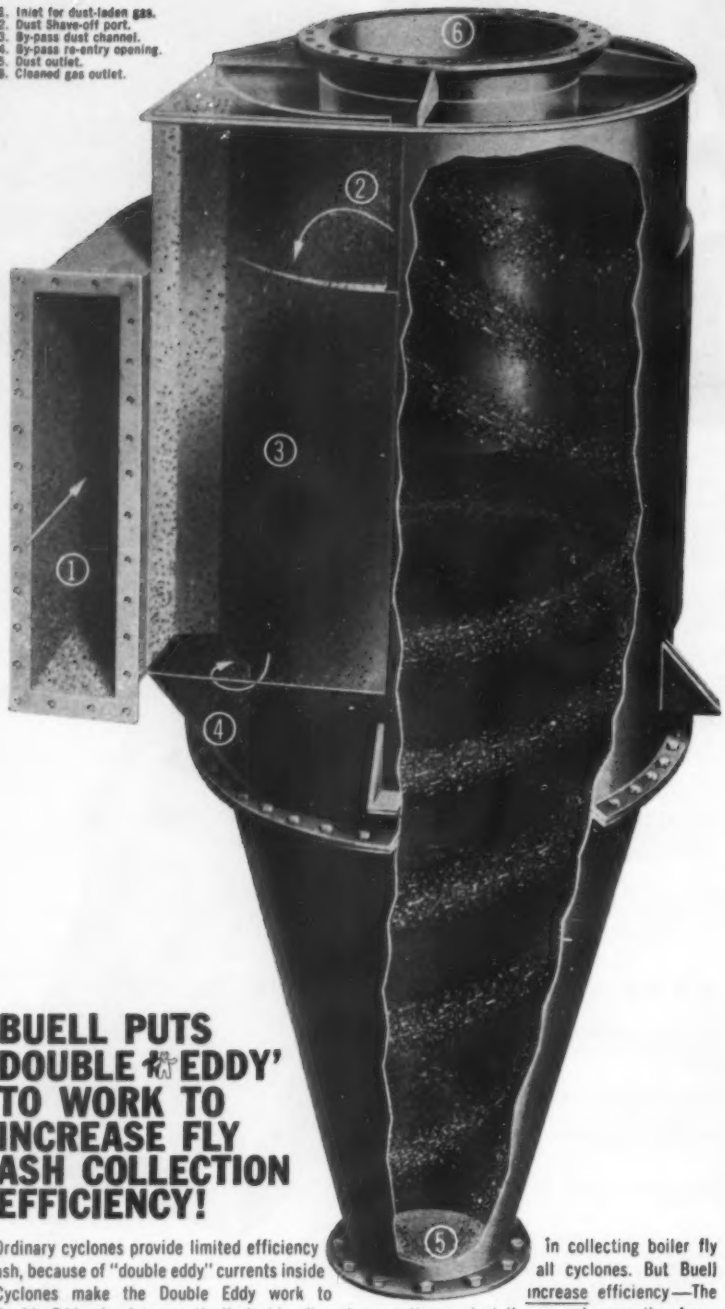
DODGE MANUFACTURING CORPORATION, 2700 Union St., Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

DODGE
of Mishawaka, Ind.

For more facts circle 605 on Reply Card

1. Inlet for dust-laden gas.
2. Dust Shave-off port.
3. By-pass dust channel.
4. By-pass re-entry opening.
5. Dust outlet.
6. Cleaned gas outlet.



BUELL PUTS 'DOUBLE EDDY' TO WORK TO INCREASE FLY ASH COLLECTION EFFICIENCY!

Ordinary cyclones provide limited efficiency in collecting boiler fly ash, because of "double eddy" currents inside all cyclones. But Buell Cyclones make the Double Eddy work to increase efficiency—The Double Eddy circulates vertically inside all cyclones acting against the normal separating force of the spinning stream of gas and ash. Buell Cyclones have a narrow "Shave-off" port (2) at the top of the casing. This port catches and removes ash trapped in the Double Eddy. It makes the cyclone more efficient instead of less.—Only Buell Cyclones have the Shave-off And only Buell Cyclones combine this efficiency with large diameter: they will not clog or plug even with loadings up to one pound of ash per cubic foot of gas. No field fitting is needed: they are completely assembled and match-marked before shipment. They can be completely lined, inside and out, against heat, corrosion and abrasion.—For a list of installations near you, a copy of our Catalog 103, or other information, call our nearest representative, listed in the telephone classified directories of most major cities under "Dust Collection Systems". Or write Dept. 14-K, Buell Engineering Company, Inc., 123 William Street, New York 38, New York. (European Subsidiary: Ambuco Limited, London, England.)

EXPERTS AT DELIVERING EXTRA EFFICIENCY IN DUST RECOVERY SYSTEMS: CYCLONES—"SF" ELECTRIC PRECIPITATORS—COMBINATION SYSTEMS—DRY CLASSIFICATION SYSTEMS.

buell®

For more facts circle 606 on Reply Card

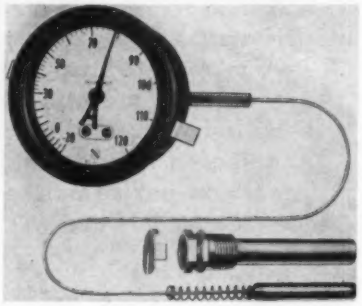
NEW PRODUCTS

(Begins on page 176)

ing to manufacturer, this sealing compound prevents seizing and galling for the life of the connection, yet allows easy disassembly because it remains plastic. It is designed to withtand temperature to 550 F, pressures to 6000 psi. Crane Packing Co.

28—DIAL THERMOMETER is remote reading instrument

Type 6440 and 6470 Series of vapor pressure actuated dial thermometers, 2½ in. in size, provides convenient reading of duct temperatures on air conditioning equipment, frozen food cabinets, pumps and oil circulating

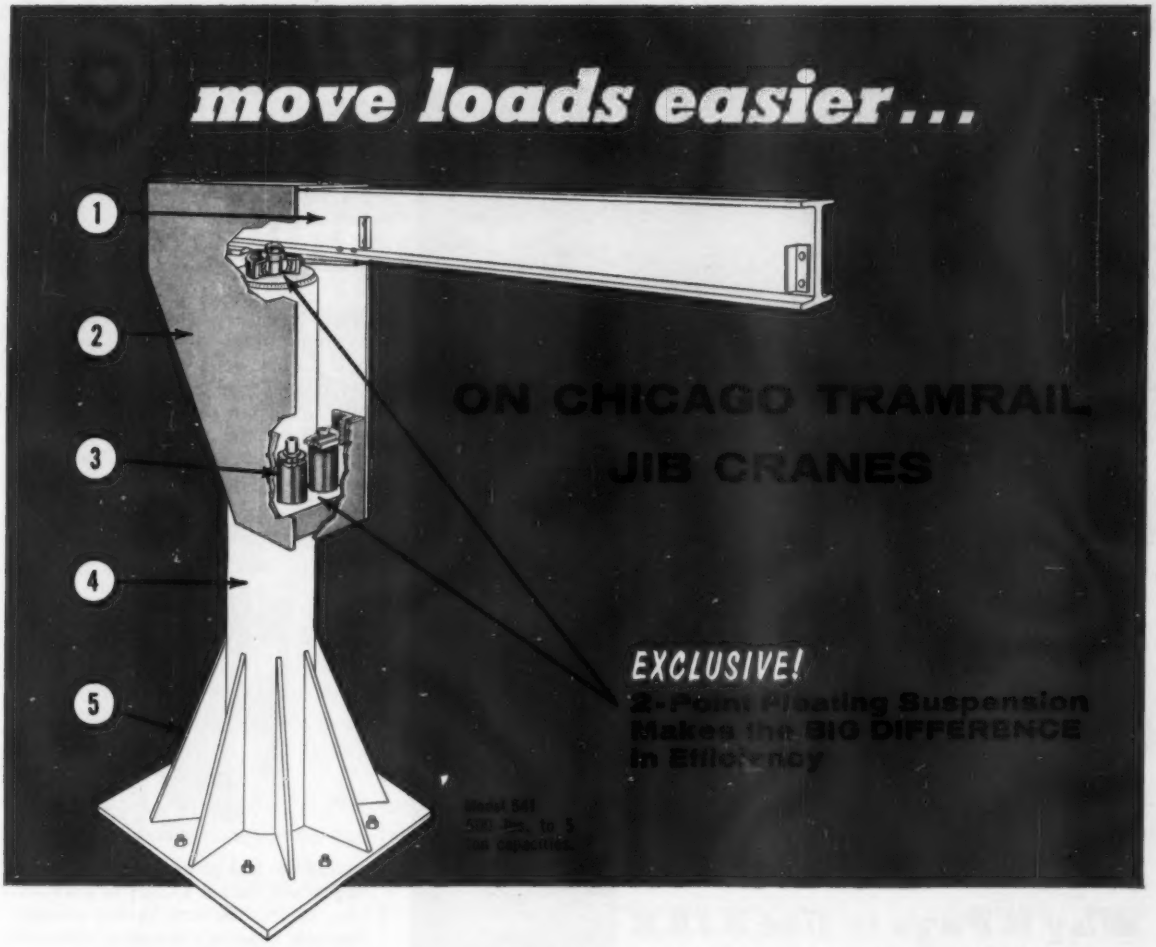


systems. Features of this adaptable instrument include: spring-clamp bulb and well assembly to allow for conversion from plain to well-type bulb in seconds, small diameter copper capillary tubing which can be positioned out of sight, adjustable pointer, gaskets to keep the thermometer "splash proof" on wet installations, and flush mounting by front flange or U-clamp. Ranges are from –40/65 F to 260/450 F and 0/100 C to 90/185 C. Manning, Maxwell & Moore, Inc.

29—COMPRESSORS for low-flow, high-head service

Developed for low-flow, high-pressure ratio applications, these centrifugal compressors feature simplicity, flexibility in materials of construction, and adaptability to handling gases other than air. They are available in both single- and two-stage designs. Advantages claimed are freedom from vibration or flow pulsations, light weight, and small space, and ability to provide oil-free air. Only a simple, inexpensive foundation is needed. Capacities range from 800 to 8,000 cfm, pressure to 1000 psia. The cast casing and forged impeller element can be made of materials to suit the application. Bearing housings and seal designs permit lubrication with water

move loads easier...



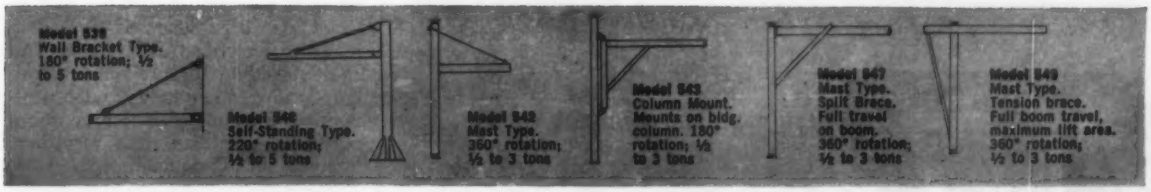
1. **High carbon, hydraulically straightened Beam designed to accommodate heavy duty electric hoists.**
2. **Rigid box construction to insure minimum deflection.**
3. **Bottom roller assembly adjustable for leveling boom.**
4. **Heavy seamless steel column.**
5. **Numerous heavy steel gusset plates welded to column and base provide accurate alignment between column and base.**

Free and easy boom swing is a designed-in characteristic of every Chicago Tramrail Jib Crane. For example, the 2-point suspension used in the Model 541 Jib Crane literally floats the boom through its 360° swing — makes heavy load handling a fast, easy job.

Two bottom load carrying rollers, equipped with heavy duty precision ball bearings, engage and bear on the surface of the vertical column; the top bearing is a precision radial and thrust bearing. This combination assures minimum drag and free boom rotation.

All structural and mechanical parts of Chicago Tramrail Jib Cranes are designed to withstand loads which include heavy duty electric hoists and 25% impact. Every detail of these cranes is designed and built to insure fast, efficient, and safe load handling. That's why you see more Chicago Tramrail Jib Cranes at work . . . and more being installed every day.

Chicago Tramrail Jib Cranes are made in more than 12 types; capacities to 7½ tons, spans to 22 ft., with heights and mounting details to suit your application. Write for complete Jib Crane Catalog.



CHICAGO TRAMRAIL CORPORATION
1324 S. Kostner, Chicago 23, Illinois

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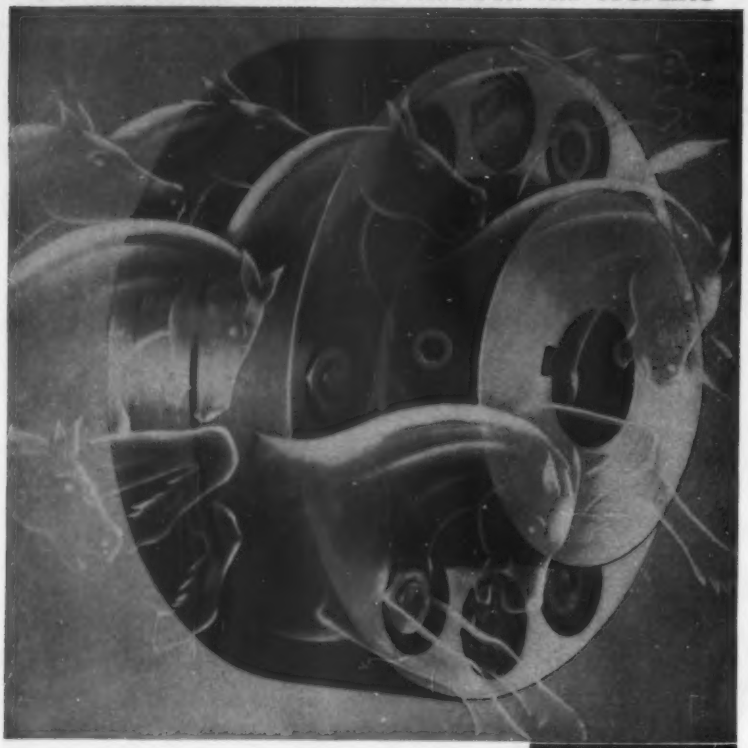
ALL THE HORSEPOWER GOES THROUGH THE COUPLING



The Basic Reason Why it Pays to Use AJAX FLEXIBLE COUPLINGS!

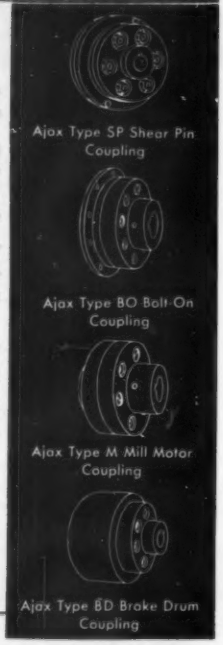
For Original Equipment and Replacement... It costs far less to safeguard bearings, gears, impellers, armatures, housings, and other working parts than today's high cost of repairs and shutdowns!

Whether you design, build, install, operate or service direct-connected machines, look into all extra economies of AJAX FLEXIBLE COUPLINGS.

Made in a complete line of types and sizes,—phone or write for catalog.

RUBBER-CUSHIONED SLEEVE BEARING TYPE

DIHEDRAL GEAR TYPE


Ajax Type SP Shear Pin Coupling
Ajax Type BO Bolt-On Coupling
Ajax Type M Mill Motor Coupling
Ajax Type BD Brake Drum Coupling

AJAX

AJAX FLEXIBLE COUPLING CO. INC.
100 English St., Westfield, N. Y.
In Canada—The Alexander Fleck, Ltd., Ottawa

Send catalog covering Flexible Couplings.

Name_____
Concern_____
Address_____

For more facts circle 608 on Reply Card

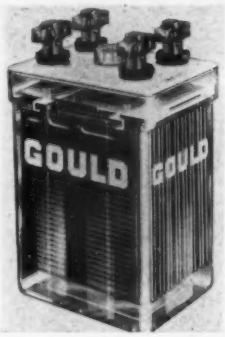
NEW PRODUCTS

(Begins on page 176)

or other lubricants, manufacturer states, and obviate explosion hazards caused by oil contamination or toxic gas leakage. Bulletin P-12 gives details. Elliott Co.

30—STATIONARY BATTERIES are lightweight, save space

Available over a wide capacity range —from 50 to 1140 amp hr—these new Kathanode batteries are designed for full float service. A rugged Plastrite jar, lighter in weight than conventional containers, is said to save 30 to 40 percent of floor space. Construction improvements announced



include a leak-proof post seal utilizing a soft rubber O-ring in compression to seal the post against seepage; the acid proof seal serves to eliminate corrosion and wet covers. Breakage of plastic cover due to weight of battery elements is claimed to be eliminated with an integral molded ledge on each end of the jars that supports all element weight. Elements are prevented from shifting, even though a cell may be accidentally inverted, since the U-shaped plastic support is bonded to the jar edge. Gould-National Batteries, Inc.

31—PROGRAM CONTROL records temp variations

Model RCA is a pneumatic temperature program control which also functions as a temperature recorder. It is reported particularly well adapted in locations where steam is a heating medium. Described as a simple and rugged method for program controlling heating applications and providing accurate and sensitive proportioning valve operation, plus recording, it comes in 10 optional temperature ranges between —30 and 1100 F. Designed to actuate an air-operated throttling valve controlling the flow of steam, water or gas or to operate other air-operated devices, Model

PRESSURETROL*
PRESSURE CONTROLLERS

Here are new additions to Honeywell's broad line of pressure switches designed specifically for industrial use. Use them for reliable, economical control of liquid or gas pressure—alone as controllers, or with other instruments for limit alarm or signalling service.

1. MODELS P428A, B, C, D FOR CONTROL OF PRESSURES TO 3000 PSI

These *Pressuretrols* consist of a single-pole, single-throw mercury switch operated by a corrosion-resistant Bourdon tube. The case is designed to harmonize with other instruments, and is ideal for use in panels. It is compact, of drawn steel with a die-cast cover, and resists dust, weather and corrosion. The *Pressuretrol* can be surface or flush mounted on a panel or installed directly on a pipe. Pressure settings are made with two knobs conveniently located on the face of the unit.

SPECIFICATIONS

MODELS: P428A, standard case, spst, breaks circuit on pressure rise.
P428B, standard case, spst, breaks circuit on pressure fall.
P428C, explosion proof, spst, breaks circuit on pressure rise.
P428D, explosion proof, spst, breaks circuit on pressure fall.

Pressure Ranges	Maximum Pressures	Bourdon Tube
30— 300 psi	375	Bronze or stainless steel
50— 600 psi	750	Bronze or stainless steel
100—1000 psi	1200	Beryllium copper or stainless steel
200—2000 psi	2400	Beryllium copper or stainless steel
300—3000 psi	3500	Beryllium copper or stainless steel

2. MODELS P444A, B FOR INDEPENDENT HIGH AND LOW PRESSURE SETTINGS

Use these *Pressuretrols* in a wide variety of industrial applications that call for independent high and low pressure settings and switching action. A pressure-actuated, corrosion-resistant stainless steel diaphragm positions a mercury switch according to selected pressure settings. The mercury switch, scale plate and pressure setting indicators can be easily seen through a protective glass window in the cover. Pressure setting handwheels extend through slots in the cover. Adaptable for either surface or flush mounting.

SPECIFICATIONS

MODELS: P444A, standard case, spst, breaks circuit on pressure rise.
P444B, standard case, spst, completes circuit on pressure rise.

Range	Maximum Pressure
20" vac.—40 psi	75 psi
1—20 psi	50 psi
5—60 psi	80 psi
5—150 psi	200 psi

Get complete details from your nearby Honeywell field engineer. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

*Trademark

Honeywell

First in Control

NEW PRODUCTS

(Begins on page 176)

RCA is engineered for program control using a plastic cam cut (at factory or on the job) to desired temperature range. Several cams can be cut for the same instrument.

Also functioning as a temperature recording instrument, the control draws a line on paper charts showing variations in temperature. It is stated that in case of a failure of the air supply, the valve will shut off, therefore shutting off the entire heat supply. A feature of Model RCA is that elements of the same scale range are interchangeable, regardless of bulb type, permitting field replacement. Bulletin 216 gives data. Partlow Corp.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

32—STEEL WORK BENCH is sturdy, has smooth top

Work-top sides and back are enclosed by a low partition in the redesigned ASI Work Bench to keep tools and work pieces from rolling off. Bench length is 4, 5 and 6 ft, depth is 24, 30 and 34 in., and height is 32, 34

and 36 in. Top surface in the model shown is heavy-gage steel with all four sides turned down and under for added strength. There are no bolts, screws or weld marks on its surface. Three other top designs are Masonite on steel, laminated hardwood for electrical or tool work, Masonite on wood core for utility service. Five drawer combinations are available; the one shown is steel with nylon rollers at bearing points. Steel shelf comes in two choices to match bench depth. Full details on these benches are in Bulletin 5950. Angle Steel, Inc.

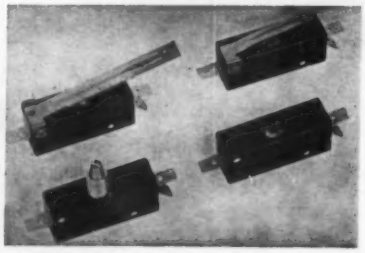
33—CIRCULATING FAN puts ceiling air back to work

These high level circulating fans, consisting of plenum chamber with air guides, and revolving or fixed discharge, draw in heated air, which accumulates at ceiling, and recirculate

it downward to floor. Revolving discharge is used to constantly change direction of downward flow, to prevent hot spots and the blocking of flow by machines, stacks of materials, other obstacles. Units utilize Wingfoil fan of compound curved airfoil design. With addition of duct intakes from roof, units may be used for summer fresh air supply, and may be converted to unit heaters by adding heating sections and steam or hot water lines. Eight sizes are available with fixed or revolving discharge, in capacities from 6000 to 25,000 cfm. L. J. Wing Mfg. Co.

34—SMALL SWITCHES with high contact pressure

These small snap action switches in pin plunger, lever action and panel mounting models feature positive make-and-break action, high contact pressure and rugged construction. Model 750-150, a pin plunger switch, is designed for limit, safety interlocking and control switch requirements. Models 750-250 and 750-251 are lever action types and can be used on applications where low operating force is available. Maximum travel for Model 750-250 is limited to ¼ in., for Model 750-251 to ¾ in. Model 750-350 features panel mounting and is designed for applications where ac-



G-B SNAP-ON DISTRIBUTORS

(See ad on facing page)

AKRON, Ohio, The Asbestos Supply Co.
ALBANY, Ga., Industry Insulation Co.
ALBANY, N. Y., Hudson Valley Asbestos Corp.
ALBUQUERQUE, N. M., Mt. States Insulation Co.
AMARILLO, McDonald Engineering & Insulating Co.
ATLANTA, Ga., Reynolds Aluminum Supply Co.
AUSTIN, Tex., Cinbar Engineering Co.
BALTIMORE, Md., Leroy Insulation Co.
BANGOR, Me., Eastern Glass Co.
BEAUMONT, Tex., Solar Supply Co.
BILLINGS, Mont., Big Horn Supply, Inc.
BIRMINGHAM, Ala., Shook & Fletcher Supply Co.
Reynolds Aluminum Supply Co.
BORGER, Tex., Western Chemical Co.
BOSTON, Mass., Homans-Kohler, Inc.
BUFFALO, N. Y., Industrial Insulation Sales, Inc.
CHARLESTON, W. Va., Baldwin Asbestos Prod. Co.
CHARLESTON HEIGHTS, S. C., Stafford Insulation Co.
CHICAGO, Ill., E. C. Carlson Co.
Culberg Asbestos & Cork Co.
CHILLICOTHE, Ohio, Southern Ohio Insulating Co.
CLEVELAND, Ohio, Ohio Asbestos & Insulation Co.
COLUMBIA, S. C., Industrial Insulation Div. of Richland Oil Co.
COLUMBUS, Ohio, Santeler Brothers
Culberg of Ohio
CORPUS CHRISTI, Tex., Precision Insulation Co.
DALLAS, Tex., Insulation Supply Co.
DAVENPORT, Iowa, Republic Electric Co.
DENVER, Colo., Gene Wright Lumber Co.
Powers Industrial Insulation, Inc.
DES MOINES, Iowa, Iowa Asbestos Company, Inc.
DETROIT, Mich., G. L. Johnston Co.
The Walter Rankin Co.
EL PASO, Tex., Insulation Specialties Co.
EVANSVILLE, Ind., George Koch Sons, Inc.
FALCONER, N. Y., Laco Roofing
FT. SMITH, Ark., Gunn Distributing Co.
FT. WAYNE, Ind., M. H. Hilt, Inc.
FT. WORTH, Tex., Bracken Co.
GREENSBORO, N. C., Starr Davis Co., Inc.
GULFPORT, Miss., Paine Supply Co.
HOUSTON, Tex., Precision Insulation Co.
INDIANAPOLIS, Ind., Lyon Lumber & Supply Co.
JACKSON, Miss., Paine Refrigeration & Supply Co.
JACKSONVILLE, Fla., Eckles Distributors, Inc.
Reynolds Alum. Sup. Co.
JOPLIN, Mo., Joplin Cement Co.
KANSAS CITY, Mo., Central Supply Co.
KEWANEE, Ill., Mechanical Insulation Co., Inc.
LAKE CHARLES, La., Solar Supply Co.
LITTLE ROCK, Gunn Distributing Co.
LOS ANGELES, Thorpe Insulation Co.
Western Fibrous Glass Products Co.
LOUISVILLE, Ky., General Insulation & Roofing Co.
MACON, Ga., Industry Insulation Co.
MEMPHIS, Tenn., John A. Denie's Sons, Co.
Gibbons Supply Co.
MIAMI, Fla., Reynolds Aluminum Supply Co.
Southern Metal Products Co.
MILWAUKEE, Wisc., F. R. Dengel Co.
MINNEAPOLIS, Minn., Asbestos Products, Inc.
MOBILE, Ala., Shook & Fletcher Insulation
MOORHEAD, Minn., Fargo-Moorhead Insulation Co.
NASHVILLE, Tenn., Reynolds Aluminum Supply Co.
NEWARK, N. J., Eastern Steam Specialty Co.
NEW ORLEANS, La., Eagle Asbestos & Packing Co.
NEW YORK, N. Y., Eastern Steam Specialty Co.
OKLAHOMA CITY, Ball Distributing & Engineering Co.
OMAHA, Nebr., Cardinal Supply & Mfg. Co.
ODESSA, Tex., Western Chem. & Supply
OKLAHOMA CITY, Okla., Ball Dist. & Eng.
OMAHA, Nebr., Cardinal Mfg. Co.
ORANGE, Conn., Insulation Supply Co.
PADUCAH, Ky., Triangle Insulation Co.
PHILADELPHIA, Pa., John F. Scanlan, Inc.
PHOENIX, Ariz., Kircher Asbestos & Rubber Co.
PITTSBURGH, Pa., Keystone Div.
Dravo Corp.
PORTLAND, Me., Eastern Glass Co.
RALEIGH, N. C., Reynolds Aluminum Supply Co.
RAPID CITY, S. D., Robbins & Stearns Wholesale
RICHMOND, Va., Reynolds Aluminum Supply Co.
ROANOKE, Va., C. E. Thurston Co.
ROCKFORD, Ill., Mott Brothers Co.
SALT LAKE CITY, Utah, Bullough Asbestos Sup. Co.
SAN ANTONIO, Tex., San Antonio Machine & Supply Co.
SAN DIEGO, Western Fibrous Glass Products Co.
SAN FRANCISCO, Western Fibrous Glass Products Co.
SAVANNAH, Ga., Reynolds Aluminum Supply Co.
SEATTLE, Wash., Western Fibrous Glass Products Co.
SHREVEPORT, La., Frith Sales Co.
SOMERVILLE, Mass., Insulation Products, Inc.
ST. LOUIS, Mo., The Stovey Company, Inc.
ST. PAUL, Minn., Asbestos Products, Inc.
SULLIVAN, Ill., Lewie David, Inc.
SYRACUSE, N. Y., Burnett Process, Inc.
TALLAHASSEE, Fla., Baker's, Inc.
TAMPA, Fla., Eagle Roofing & Art Metal Works, Inc.
TULSA, Okla., Ball Distributing & Engr. Co.
TUPELO, Miss., Paine Supply Co.
WASHINGTON, D. C., Walter E. Campbell Co., Inc.
WICHITA, Kans., General Metals, Inc.

They compared "K" factors and cost factors . . . and bought G-B SNAP*ON®

FOR FREE TEVA SURVEY CALL YOUR LOCAL G-B SNAP*ON DISTRIBUTOR (LISTED IN ADJOINING COLUMN)

Here's how you can save installation costs on fittings — simply use G-B Snap*On, the original one-piece pipe insulation molded of fine glass fibers. Nothing could be easier than insulating bends, valves and fittings with cut-and-mitered G-B Snap*On — and you get a neat job, uniform in thickness.

On straight lines, too, no pipe insulation is so economical to apply as G-B Snap*On — just spread the single seam and it snaps over pipe. In thermal efficiency G-B Snap*On rates at the top of all general purpose pipe insulations on the market today. But make a cost comparison yourself by asking your G-B Snap*On distributor for a TEVA (Thermo-Economic Value Analysis) survey the next time you insulate piping. You'll find for economy, for performance, for permanence, there is *nothing* like G-B Snap*On!

GUSTIN-BACON *Manufacturing Co*

232 West 10th St., Kansas City, Mo.

Thermal and acoustical glass fiber insulations • Molded glass fiber pipe insulation

Couplings and fittings for plain and grooved end pipe

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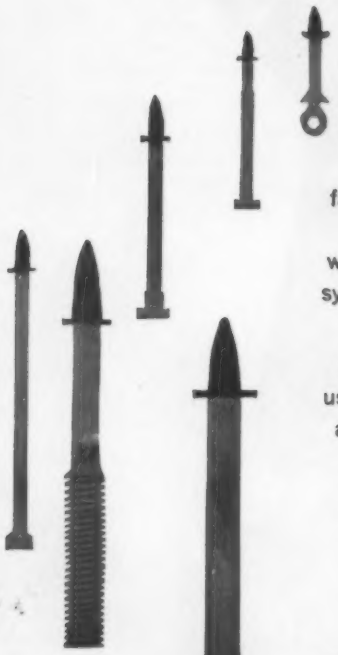
ONLY RAMSET

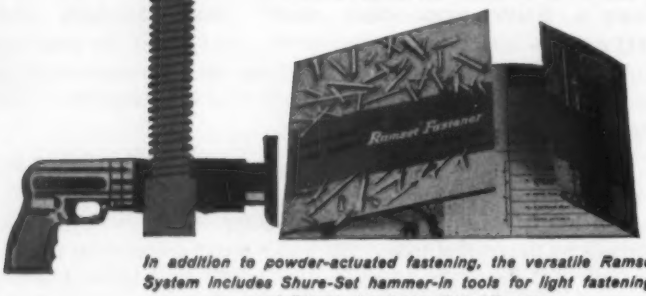
offers over 100 different powder-driven fasteners for specific jobs



Ramset, and only Ramset, offers a complete line of "job-fitted" fasteners . . . guarantees the most economical fastener for every application. Versatile Ramset is the best-known and most widely-used powder-actuated fastening system in the entire maintenance field.

In fastening to steel, concrete or masonry, Ramset tools are easiest to use . . . Ramset austempered fasteners are the best you can buy, and perform where others fail. Find out about the astounding savings . . . the absolute superiority of the Ramset Fastening System. Find your dealer's name under "Tools" in the Yellow Pages or write us direct.

Write for your copy of this handy fastener guide



In addition to powder-actuated fastening, the versatile Ramset System includes Shure-Set hammer-in tools for light fastening, and Ringblaster heavy-duty kiln gun.

Ramset Fastening System

WINCHESTER-WESTERN DIVISION • OLIN-MATHIESON CHEMICAL CORPORATION
2167 — BEREA ROAD • CLEVELAND, OHIO

For more facts circle 611 on Reply Card

NEW PRODUCTS

(Begins on page 176)

tuating motion cannot be accurately controlled. It has liberal overtravel movement and is adaptable for door switch, limit, safety interlock and control applications. Industrial and Commercial Controls Div., Controls Co. of America.

35—CIRCUIT BREAKER is hydraulic-magnetic unit

Described as unusually small for its 200-amp rating, the SE33 Hydraulic-Magnetic Circuit Breaker utilizes company's Companion-Trip feature. Poles are in separate "compartments" within the common case to provide effective di-electric separation of breaker contacts. They are linked externally by a single handle. A kick-

spring serves to provide emphatic tripping action when an overload occurs on either pole. The magnetically actuated breaker reacts only to load current changes produced in a solenoid sensing coil, it is noted, and ambient temperatures have no effect upon breaker's current rating or trip points. Instantaneous tripping at 10 times breaking rate, or above, provides fast interruption under short circuit conditions. According to company, the basic magnetic design principle makes de-rating and other temperature compensations unnecessary. Since it is non-thermal, unit can be reset immediately after a fault has been corrected. Rated at 120/240 v a-c, it has interrupting capacity of 10,000 amp., comes in ratings of 125, 150, 175 and 200 amp. Heinemann Electric Co.

36—RUST SOLVENT is fast acting, penetrating

KPO No. 1 is said to have exceptional wetting power which enables it to penetrate deeply and quickly into rust-frozen surfaces. Thus nuts and bolts can be separated and flanges,

For more facts circle 612 on Reply Card ——→

effective automation begins before the start with COORDINATED CONTROL

Automatic control, the vital element which helps make automation and its many important production benefits possible, involves much more than top quality control equipment. And for most effective automation, automatic control begins long before the start-up—should in fact be the starting point for automation planning.

Today, automation's demanding need for greater effectiveness through continuous, controlled operation, can only be fulfilled by coordinated control —automatic controls designed with a thorough knowledge of, and completely integrated with, all the elements which comprise an automated process, system, or machine.

Since automatic control is the "nerve center" of industry's highly complicated electrical drive systems, only a control specialist is best qualified to coordinate these systems—a control specialist whose product and industry trained engineers work as partners with engineering and manufacturing personnel, consulting engineers, contractors and other equipment suppliers.

That's why today, more and more automation-minded manufacturers everywhere are turning to Clark Controller for completely coordinated control engineering service and equipment.

For concept to start-up coordination of the automatic control in your particular operation contact your nearest Clark Controller sales office. Or, write direct to The Clark Controller Company. 9A1

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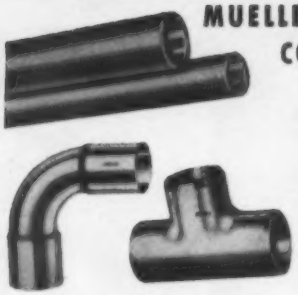
You Can Get Everything
for every kind and type of
INDUSTRIAL PIPING SYSTEM
From *ONE* Dependable Source



MUELLER BRASS CO. Streamline COPPER TUBE AND FITTINGS

Streamline Copper Tube and Solder-Type Fittings make a tight, sanitary system with clean, unobstructed joints that withstand jars and vibrations. Streamline tube and fittings are lightweight, (longer lengths can be conveniently handled, eliminating many fittings); resist corrosive acids, clogging, will not rust. Products available include K, L, M and DWV copper tube as well as both cast and wrought solder-type fittings in a complete range of sizes.

MUELLER BRASS CO. PVC RIGID PIPE AND FITTINGS

PVC for industrial piping withstands shock, impact, vibration and twisting; can be used at higher pressures than other similar materials. PVC resists corrosive action of water, oil, alkaline or salt solutions, gases and a wide variety of acids. Economical, lightweight, PVC is fabricated in 20' lengths; ½" through 3" sizes.

MUELLER BRASS CO. VALVES OF ALL TYPES

Streamline valves are ruggedly designed and built to give years of trouble-free service. They are made of non-porous, cast red brass and all working parts are precision machined for perfect alignment of seating surfaces. Positive seating is further assured by tough composition discs. Complete range of sizes and styles includes compression stops, gate, globe and swing check valves, boiler drains and sill cocks.

Write today for complete information on Mueller Brass Co. products for any industrial piping system.

282

MUELLER BRASS CO.
PORT HURON 52, MICHIGAN
For more facts circle 613 on Reply Card

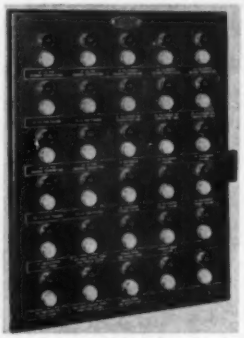
NEW PRODUCTS

(Begins on page 176)

couplings, pulleys and wheels can be easily removed from shafts. It also has the necessary film body to lubricate and protect parts being disengaged, company notes, and low volatility provides long-lasting action. It is available in enclosed-spout pint cans, and in 1- to 55-gal containers. Keystone Lubricating Co.

37—ANNUNCIATOR SHOWS component failure, too

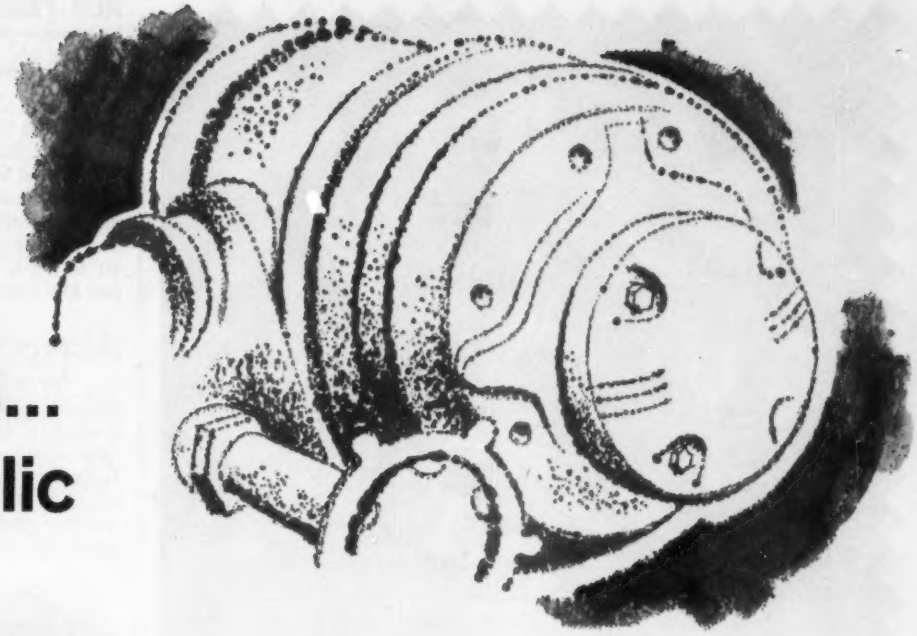
The Series 50FS Fail-Safe Annunciator is designed to enable operator to differentiate instantly between its own component failure and an "off-normal" field condition in the plant. It



utilizes two lamps per annunciator point—red alarm lamp indicates field abnormality, white lamp signals annunciator component failure and doubles as running lamp during such failure. Although annunciator component failure is infrequent, the 50 FS is designed to eliminate guesswork checking when no corrective action is required, and guard against faulty action which could destroy equipment or product. It also identifies position that failed. Panellit, Inc.

38—IMPROVED ABRASIVE for wet blasting, cleaning

Consisting primarily of glass beads, made uniformly round. Liquasheen gets its name from the silvery sheen it imparts to work cleaned and finished. Combined with the abrasive's resistance to fingerprinting on nonferrous parts, its resistance to water staining in drying of parts and its characteristic not to flower or highlight, the sheen imparted frequently provides the desired finish on end products, company says. In other applications, such as cleaning of tire molds, the finish imparted to the mold permits its use through greater number of cures while imparting better



Pumps... hydraulic oil... and profits

Faulty hydraulic pumps cut production. Rust, varnish and sludge interfere with precise control—in many cases bring a production line to a dead stop and whittle profits. Special inhibitors in Sinclair Duro Hydraulic Oils have earned the reputation for protection against varnish and sludge. Furthermore, Duro's rust inhibitor has a preferential metal-wetting action that forms a tough barrier against water penetration. Next time management asks how you've cut costs, tell them you've switched to Sinclair Duro...and show them the results.

Call your **Sinclair Representative** for further information, or write for free literature to Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N. Y.

Sinclair

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Duro Hydraulic Oils

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Four "Bonus Values" Add to the Safety of Acco X-Weld Sling Chains!

• For certain types of lifts, there is one and only one product to use for maximum safety and efficiency...chain! But why only chain? Because chain offers qualities of tensile strength and flexibility not found in any other material. The next time you are confronted with an extra-heavy lifting problem, don't take a chance with a makeshift sling *that may not do the job!* Be sure...with ACCO *Registered* Sling Chains! Only with ACCO *Registered* Sling Chains do you get these four "bonus values" which add materially to the worth, but not the cost, of the sling...

1. **Accoloy X-Weld Chain** for extra strength. X-weld hangs straight... cannot kink...has extra resistance to bending
2. **New Shaped Master Link** is designed to withstand deformation under loads up to 18% greater than round section link
3. **Acco Registration Ring** is serially numbered as evidence that the sling has been proof-tested at twice its working load limit
4. **Registration Certificate** signed by American Chain & Cable Company attests to the field-design of the complete sling

Only ACCO *Registered* Sling Chains, with Magnafluxed-tested hooks, give you premium quality features at regular prices. Find out about them from your nearby ACCO *Registered* Sling Chain Distributor or write us at York, Pa., for full details.

ACCO Registered
SLING CHAINS

American Chain Division • American Chain & Cable Company, Inc.
Bridgeport, Conn. • Factories: *York and *Braddock, Pa.
Sales Offices: *Atlanta, Boston, *Chicago, *Denver, Detroit, *Houston, *Los Angeles, New York, Philadelphia, Pittsburgh, *Portland, Ore., *San Francisco
*Indicates Warehouse Stocks

ACCO

For more facts circle 615 on Reply Card

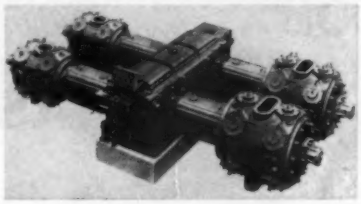
NEW PRODUCTS

(Begins on page 176)

appearance to end product, it is noted. Liquasheen is used in wet blasting of zinc die castings, aluminum, nickel, silver, steel and other metals prior to cleaning and in general cleaning to remove fluxes, discoloration, scale. Service life is reported to be about 40 to 50 hr of blasting time. Techline Div., Wheelabrator Corp.

39—PROCESS COMPRESSOR for extra heavy duty

Rugged construction of crankcase, crankshaft and running gear are features announced for the Model CJA Balanced/Opposed Process Compressor. For heavy duty applications in refining, chemical and petrochemical industries, this 11-in stroke machine



is available with two, four or six cylinders. Sizes range from 400 to 1750 bhp. Rated speed is 450 rpm with drive furnished by electric motor, or other types of prime movers. Reported ideal for high operating and high differential pressures, Model CJA can be equipped with a variety of compressor cylinders in many sizes. This flexible design permits assembly of machines to handle pressures from vacuum to 35,000 psi. For most applications, compressor valves are multiple ring type, cast of nodular iron for smooth surface and minimum resistance to gas flow. For high operating pressures, valves can be forged carbon steel or alloy steel. Full specifications are in Bulletin 160. Clark Bros. Co.

Use the Reader Service Cards provided on pages 251-252 to ask for more information on these products. Circle item numbers of the products in which you are interested.

40—CONDENSING UNIT puts rejected heat to use

The AL Aircon is a blower type air-cooled condensing unit designed to utilize rejected condenser heat for heating and ventilationg. The unit

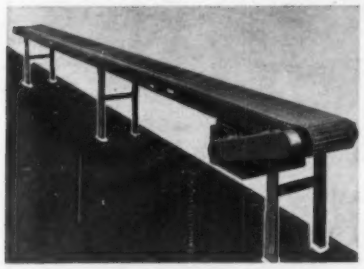
is described as combining refrigerant condensing with heating and ventilating and is claimed extremely flexible for indoor and outdoor use. It can also be used for exhaust ventilation and/or heating and ventilating. Unit can be ceiling, platform or floor mounted, and its low silhouette is well adapted for roof mounting. It is available in eight unit arrangements, with capacities ranging from 10 to 50 tons. McQuay, Inc.

41—RELIEF VALVE designed to work without chatter

The Hydro-Valve is designed specifically to be stable and non-chattering and to provide full-rated capacity in liquid service. It will not drum, chatter, or hammer on any application, company says, either bypass or emergency relief. The hammering is eliminated by a special design of the throat, seat, and baffle construction. Valve is available with a bellows if necessary to keep working parts away from contaminants, and corrosive or viscous fluids. Plain valve is available in 1 to 8 in., the bellows version in 1½ to 8 in. J. E. Lonergan Co.

42—BELT CONVEYOR stands abnormal temperatures

This roller bed conveyor with flat wire mesh belt is reported especially suited for handling articles above or below normal temperatures—as in cold storage plants. It is engineered and constructed in unitized design. Two models are available, one equipped with center drive and take-up and fixed end pulleys, and the other model with end drive and end take-up. It is supplied in lengths to suit requirements with standard widths of 12, 18 or 24 in. Conveyor Specialty Co. Inc.



43—SAFETY MITT is reversible, interchangeable

Greater comfort and much longer service life are claimed for the Kelnit Klaw, a reversible-interchangeable safety mitt. It is said to outwear up to four conventional work gloves due to its combination of Iron-Kore fabric and two individual wearing sur-

Try this...with any sling other than a Cable-Laid!

• You would soon discover that even a smaller sling has nowhere near the flexibility, resistance to kinking and freedom from crankiness that this two-inch ACCO *Registered* Cable-Laid Sling exhibits. While we do not recommend that you use Cable-Laid Slings like this, we do urge that you use these versatile slings for any lifting application where ease of handling is all-important.

The secret of ACCO Cable-Laid Slings lies in the construction of the wire rope—a combination of six individual wire ropes, not strands, laid around a special steel center. For this reason, Cable-Laid Slings won't kink—even when used on heavy loads with square corners.

ACCO Cable-Laid Slings are clean and bright because they're Galacco coated. Patented DUALOC endings also double-lock sling ends for double security.

And, of course, ACCO Cable-Laid Slings are *Registered* Slings. This is your assurance that each sling is proof-tested at twice its rated load-carrying capacity. Then, and only then, does it merit the ACCO tag and certificate of registration.

Ask your nearby distributor about Cable-Laid—or write us at Wilkes-Barre, Pa., for **Folder DH-532** listing strengths and weights of a full range of Cable-Laid Slings.

ACCO Registered
WIRE ROPE SLINGS

Wire Rope Sling Dept. · American Chain & Cable Company, Inc.
Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.
In Canada: Dominion Chain Company, Ltd., Niagara Falls, Ontario

ACCO

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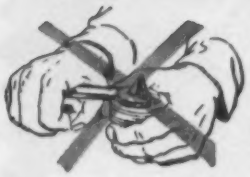
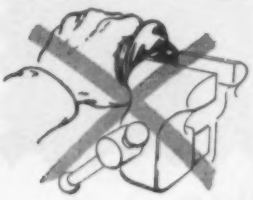
Now . . . from Barnes & Jones . . . the BIGGEST DROP in Steam Trap Maintenance in 50 Years!



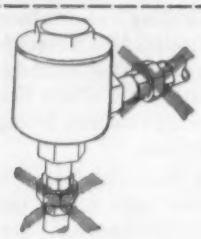
No parts — no assembly.

Barnes & Jones has been recognized for over half a century as a leader in thermostatic traps for the heating trade. Now — the same basic cage unit feature that revolutionized radiator traps thirty years ago is available for high pressure process steam applications.



No special tools or shop required.

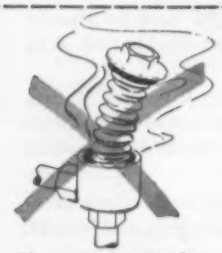
Now — costly, time-consuming steam trap repairs are outmoded. For with this new B-J Cage Unit replacement, you simply drop a complete new interior into the trap and it's new again. And if steam trap maintenance is a bugaboo with you — it's the best and biggest drop you can make.



No need of unions.

Also — Barnes & Jones Cage Unit interiors are available to renew other makes of industrial traps.

If you're interested in saving steam, cutting repair and maintenance time and improving trapping efficiency, write today for "The Steam Trap Primer". You'll see the 'hows' and 'whys' of steam trap performances. And perhaps you'll see how B-J high pressure traps and cage units can end your steam trap problems.



No over-expansion of bellows.

Be Wise . . . Be Sure . . . B-J

Barnes & Jones, Inc.
34 Crafts Street
Boston 60, Massachusetts

For more facts circle 617 on Reply Card

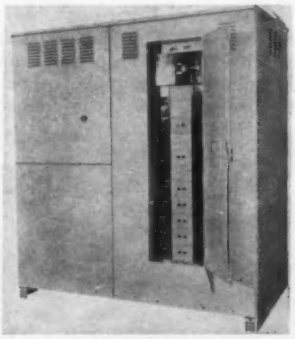
NEW PRODUCTS

(Begins on page 176)

faces. The mitt has an extra thumb tucked in across the back of the hand. Besides giving additional cushion protection for this area, the "second" thumb can be pulled out and the original thumb tucked in when the latter becomes worn. The mitt is sold as a separate unit, fits either hand. The fabric, which has a surface of closely woven loops, is said to dissipate heat and resist cuts from sharp metal edges. Keller Glove Mfg. Co.

44—DISTRIBUTION CENTER is smaller, lighter, quieter

This integral distribution center with high-temperature insulation is announced as up to 30 per cent smaller, 15 per cent lighter than previous designs, and 16 decibels quieter than NEMA standards for transformers of similar ratings. The one-piece design uses QHT (quiet high-temperature) transformers and combines all three sections necessary for load center application—incoming line switch and fusing, transformer, and outgoing feeder breakers—into an integral unit.



The standard line is metal-clad and available in ratings from 75 to 225 kva. Standard primary voltage ratings run from 2400 through 4800 v. Secondary voltages range from 208Y/120 through 600 v. Transformers are vibration isolated from the structural frame, and transformer taps are accessible from the front on a panel in the high-voltage section.

In the standard arrangement, the high-voltage section is on the left side of the center, with clamp type terminals provided for single or loop feed. The low-voltage section is mounted vertically on the right front side and eliminates need for a separate enclosure to contain breakers. It is separated from both the high-voltage section and transformer for safety protection and to provide thermal isolation. Each compartment has

"THESE MAINTENANCE TIPS SHOULD END OUR BEARING FAILURES— THANKS TO DISTRIBUTOR DAN THE SKF BEARING MAN"

"Even I can learn something about the proper care of bearings from Distributor Dan—he's an expert," the mechanic told the foreman. "He's showing us the right way to clean bearings. It should help us get better performance from our bearings—including longer life."

Preventive maintenance is one of the many services *authorized* SKF distributors offer. These bearing specialists can also help you simplify ordering, reduce inventory—and give you immediate delivery from their complete and diversified stocks of SKF ball and roller bearings.

But why not find all the ways authorized SKF *distributors can help you keep production running smoothly? Just call the one nearest you.* 5925

Spherical, Cylindrical, Ball, and Tyson *Tapered Roller Bearings*

EVERY TYPE—EVERY USE

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WHEELABRATOR® DUSTUBE® COLLECTORS provide complete, economical dust control

No plant is too big, no problem too tough, no air pollution code too strict for Wheelabrator dust and fume control engineering to solve the problem at minimum cost.

In complete plant ventilation, for example, Wheelabrator Dustube systems are successfully handling as much as 2,500,000 c.f.m, as in the installation at the 12-story Jeffrey Mill of Johns-Manville Co., Ltd., Asbestos, Quebec. And there are hundreds of other installations, large and small, in which Wheelabrator Dustube systems regularly perform with 99+ % efficiency.

Wheelabrator takes a "wide-angle" view of air pollution problems, to solve the total problem, not merely shift it to another area. There's no cost or obligation for consultation with a Wheelabrator dust and fume engineer. For complete information write for Catalog 372C. Wheelabrator Corporation, Dust & Fume Division, 859 S. Byrkit Street, Mishawaka, Indiana, Canadian Division, P. O. Box 490, Scarborough, Ontario.

WHEELABRATOR
DUST AND FUME CONTROL

For more facts circle 619 on Reply Card

NEW PRODUCTS

(Begins on page 176)

a separate flow of cooling air. Standard designed centers are 76 in. high, 37 in. deep, 70 in. wide. There's a choice of components for both high- and low-voltage sections. Bulletin GEA-6619 gives further information. General Electric Co.

45—MICA MAT TAPE doesn't need varnish or baking

This mica mat tape requires neither varnish nor bake treatment during application, company says. An all-purpose, form-wound insulator, it is expected to find wide application in motor repair shops where it eliminates necessity for stocking several grades and sizes of insulating tape. Engineers say "dry" application is made possible by tape's extreme flexibility and uniform thickness which allows it to conform to surfaces in void-free layers. Tape uses four-layer construction that sandwiches ribbons of mica mat and glass cloth between two outside films of Mylar polyester insulation. General Electric Co.

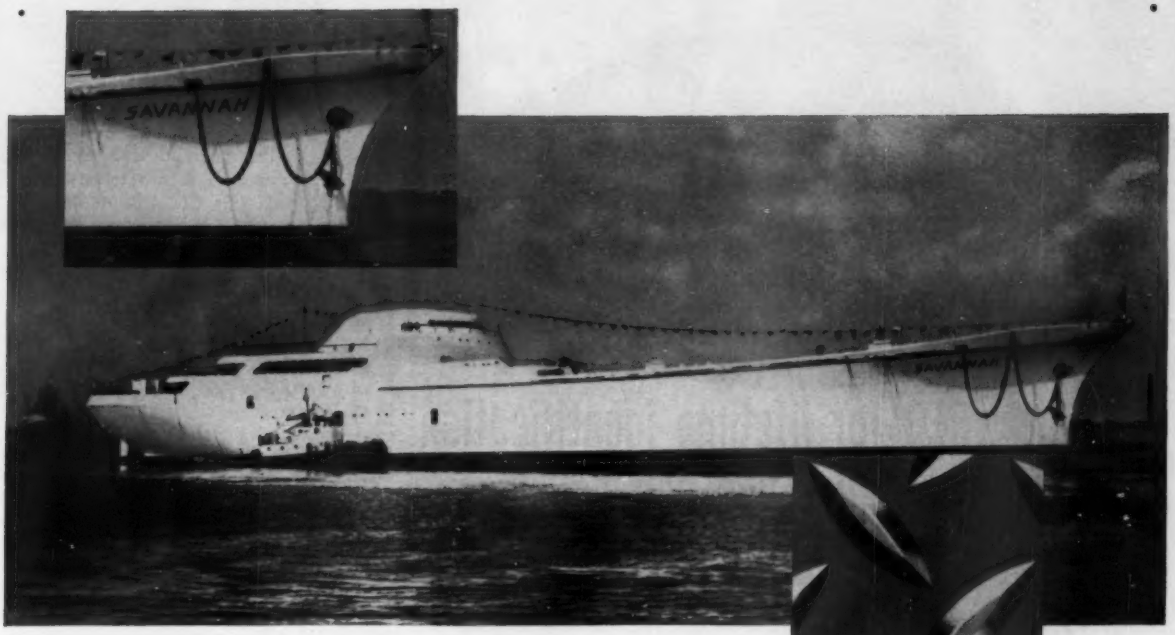
46—REVOLVING HANDLES ease hand-wheel turning

These aluminum handles feature an extra long bearing surface to reduce turning friction and wear and provide additional strength. As the hand-wheel is turned, the revolving handle

grip spins on a steel stud attached at right angles to the hand-wheel. It is attached by inserting stud at convenient location on wheel and slipping handle grip over stud. The locking ring assures positive fit, manufacturer says, and handle can be removed and reassembled as often as desired. Five handle lengths range from 1-9/16 to 3¼ in. Jergens Tool Specialty Co.

47—METAL CONDITIONER removes rust, mill oil

Improved Chem-Bond is reported to remove rust, corrosion and mill-oil in a single step, and also to retard corro-



Safety Is Sure . . . *on the N.S. Savannah*

A. W. Super Diamond floor plate assures safe footing on new atomic-powered cargo ship

Floor plate on the N.S. Savannah, world's first nuclear-powered merchant ship—is Alan Wood Super Diamond. Described as "the safest ship in the world," the Savannah, built by New York Shipbuilding Corporation, Camden, N.J., was designed and constructed to meet the highest safety standards of several government agencies, including the Maritime Administration and the AEC.

A.W. Super Diamond is installed throughout the ship to provide officers and crew the safest footing available. This heavy duty floor plate will last for years . . . is easy to clean . . . easy to fabricate . . . easy to match.

Specify A.W. Super Diamond for your "safety-sure" flooring. Write for Bulletin SD-N3.

ALAN WOOD STEEL COMPANY

CONSHOHOCKEN, PA.

DISTRICT OFFICES: Philadelphia • New York • Los Angeles • Boston • REPRESENTATIVES: Atlanta • Buffalo Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle Montreal, Toronto and Vancouver, Canada—A. C. Leslie & Co., Ltd.

For more facts circle 620 on Reply Card

CM—mark of quality chain.

it's BRANDED for lifetime identification it's SAFER because you can be sure of its grade (strength)

NO MORE GUESSING about chain. Now you can be absolutely sure, the day you get it or months later, that you are using the right chain for the job. CM chain, always tops for quality, now brings you this added feature at no extra cost . . . a chain that is ***clearly*** and ***permanently*** branded by Make and Grade for lifetime identification.

BBB—grade of coil chain made from low carbon steel.

HOW IT'S DONE—The mark is embossed onto, not stamped into, the link. The Make and Grade appear alternately at approximately 10" intervals along the chain opposite the weld and on one side of the link only.

INSWELL
PROOF COIL
similar to BBB but with links somewhat longer.

HIGH TEST
heat treated carbon steel chain for load binding and general use where ***extra strength*** and ***wear resistance*** are important.

HERC-ALLOY
the original alloy steel sling chain. This grade should always be used for SLING or LIFTING APPLICATIONS.

Available on Inswell Proof Coil, BBB, High Test and the ½" and smaller sizes of Herc-Alloy chain.

Specify CM Inswell for the best of everything in chain

COLUMBUS McKINNON CHAIN CORPORATION
TONAWANDA, NEW YORK
NEW YORK • CHICAGO • CLEVELAND • SAN FRANCISCO • LOS ANGELES
Warehouses: San Francisco, Los Angeles, Portland, Salt Lake City and Dixon, Ill.
In Canada: McKinnon Columbus Chain Limited, St. Catharines, Ontario

CM® INSWELL® HERC-ALLOY® PAT. APP. FOR BRANDED CHAIN

CM CHAIN

For more facts circle 621 on Reply Card

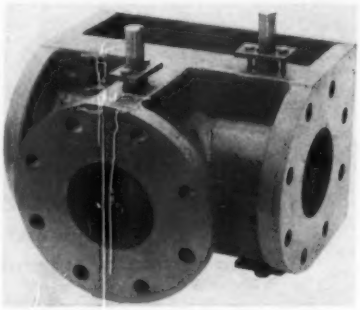
NEW PRODUCTS

(Begins on page 176)

sion and oxidation and deposit a colorless phosphate coating on metal surfaces. Paint, enamel, lacquer and plating adhere to metals treated and conditioned with Chem-Bond, manufacturer states. It is applied by immersion, brush-on wipe-off, or spray. According to company, the improved version is distinguished by good rinsability and imparts to coatings a superior impact-resistance. A further advantage noted is that ferrous metals, zinc-base die castings, galvanized iron, aluminum, copper and brass can be cleaned and phosphatized with same solution. Bell-Ray Chemical Corp.

48—CONTROL VALVE comes as two-in-one unit

The Triangle Valve is designed to do the work of two conventional butterfly valves and a flanged "T" connection. It will control flow in cooling water systems and in other applica-



tions where two streams flow to or from a single pipe. Claimed to be easy to install and maintain, and to fit piping arrangements without alignment and adjustment, the two-in-one valve is constructed of corrosion resistant materials and comes with metal seated or positive-sealing, Neoprene-seated valves. Available in sizes 1 through 12 in. U. S. Valve & Engineering Co.

49—ELECTRIC COMPARATOR spot checks small parts

No larger than a toolbox, the Limit Signalling Comparator operates on radio frequency and is trained to give instantaneous response. The instrument is described as ideal for inspecting materials as they are received from supplier, spot checking during production runs, or post process gaging. Comparator can be set up in seconds merely by plugging in to a 110-v outlet. It consists of a master control, electronic circuits and power supply. Nine gage heads are available, permit-

Change hats
with your maintenance man . . .

You'll find out . . .

Vertical Lift Metal-clad Switchgear's mechanism is up front for easy access

Change places for a moment with the man who maintains your metal-clad switchgear. You'll probably discover you prefer—as he does—to work with General Electric Vertical Lift Metal-clad.

One big reason . . . Vertical Lift is the only metal-clad which has the breaker operating mechanism right up front where it's easy to get at. Unlike designs which locate the mechanism under the contacts, the G-E mechanism can be exposed for inspection in less than a minute. Vertical Lift saves your maintenance crews time, saves your company money. General Electric Company, Schenectady 5, New York. 511-35

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 622 on Reply Card

NEW

ANGLE

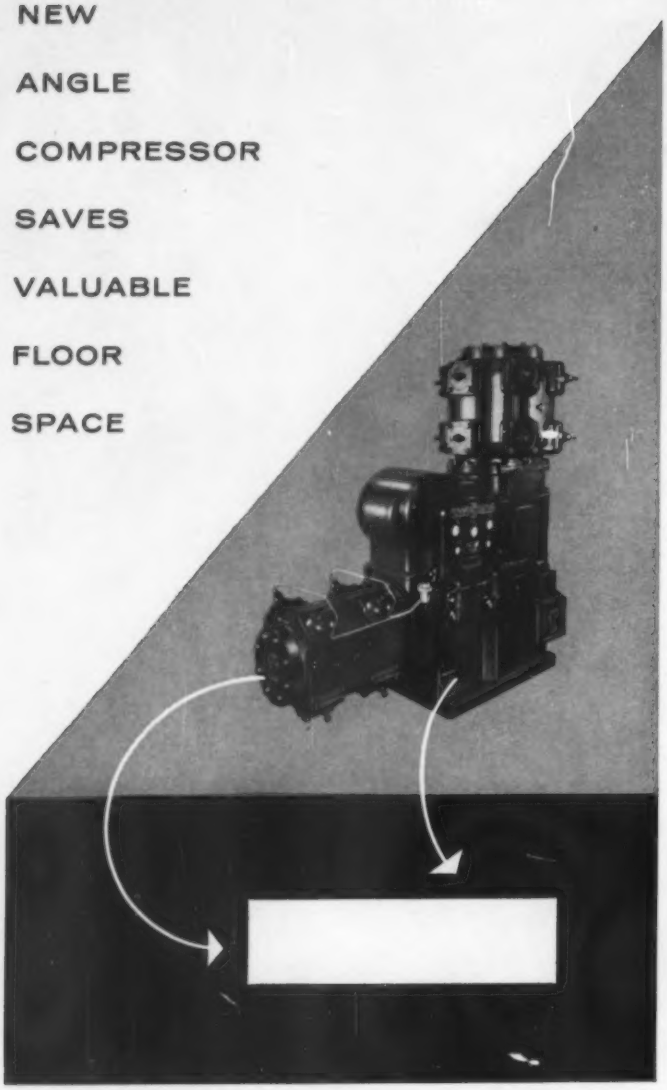
COMPRESSOR

SAVES

VALUABLE

FLOOR

SPACE



Look at all the space you save with the Pennsylvania HAE Angle Compressor. The 150 HP size, shown here, takes only 5' 5" x 7' 2" of floor space, including motor.

Now you can get efficient air service in a small space. It's the Pennsylvania HAE Angle Compressor—a dependable, two-stage, water-cooled double-acting compressor, built for continuous, heavy duty service. Designed with one vertical low pressure cylinder and one horizontal high pressure cylinder, it's compact, self-contained, pressure lubricated and ready to run when installed.

The HAE uses the same highly-efficient, trouble-free Air Cushion Valve found in all Pennsylvania Compressors. Its unique design eliminates use of bolts, nuts or screws likely to burn fast or work loose. Life is prolonged, maintenance diminished. For full information on Pennsylvania HAE Angle Compressors, write for your free copy of Bulletin 625.

PENNSYLVANIA PUMP AND COMPRESSOR CO

EASTON, PA. • Earning customer confidence since 1920

For more facts circle 623 on Reply Card

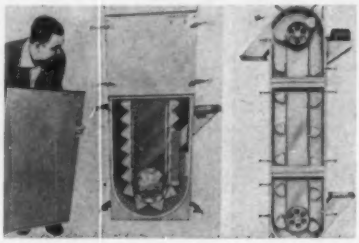
NEW PRODUCTS

(Begins on page 176)

ting direct readings from 0.000050 to 0.001 in. per dimension. Unit can be installed in fixed position or carried to the job. Radio Corp. of America.

50—BUCKET ELEVATORS designed for easy cleaning

Two new bulk material conveyor elevators designed to permit access to interior for easy cleaning, includes the



V series of sanitary conveyor elevators (centrifugal discharge type, applicable to a wide range of food products and chemicals), and the VC series of continuous discharge elevators with overlapping buckets for gentle product handling. Both feature cantilever design for quick disassembly, seamless buckets, rounded corners and shrouded bolts. Available in stainless, galvanized or carbon steel. The Bucket Elevator Co.

51—TEMP REGULATOR can cope with load swings

By cascading of an air signal to a pressure regulator, this manufacturer has developed a low cost air controlled temperature regulating system for systems subjected to wide and sudden load swings. Tests are reported to show control accuracy of 6 to 8 F over a 24 period during which instantaneous load swings from 210 to 80 gpm water flow were handled while controlling temperature to within ± 5 deg of set point.

Immediate response to sudden changes in demand is made possible by pressure regulating action of the externally piloted main valve, it is explained, and temperature control is obtained from the cascaded air system which loads the pilot. By combining both functions in one simple system a pressure reducing valve—often required ahead of the diaphragm-motor valve in instrument control systems—is not required. Quick response is based on a bimetal temperature sensing element. The temperature pilot continuously regulates a loading air pressure. This loading signal when ap-

Compact and completely pre-assembled, **Inland Empire Paper Company's Package Air Preheater is ready to be connected to a 100,000 lb/hr boiler. This particular Package Air Preheater (incidentally a repeat order), measures approximately 10'x10'x8', and its 7000 square feet of effective heating surface will recover about 360° F. from the stack gas. Package design cuts installation time and costs drastically.**

Here's why
Inland Empire Paper Co.
chose a

PACKAGE AIR PREHEATER

BIG INSTALLATION SAVINGS — AND FUEL SAVINGS THAT CAN PAY FOR THE AIR PREHEATER WITHIN TWO YEARS.

Inland Empire Paper Company, Millwood, Wash., makes these big savings with their Package Air Preheater:

1. Low-cost installation. That single unit on the truck is a *complete* Package Air Preheater. Once in place, and the ducts and power line hooked up, it will be ready to go—installed without erection in a fraction of the time required for conventional units.

2. Short-term write-off. Records of Package Air Preheaters operating all over the country prove that Inland Empire's Package unit can pay for itself in two years, just on fuel savings alone!

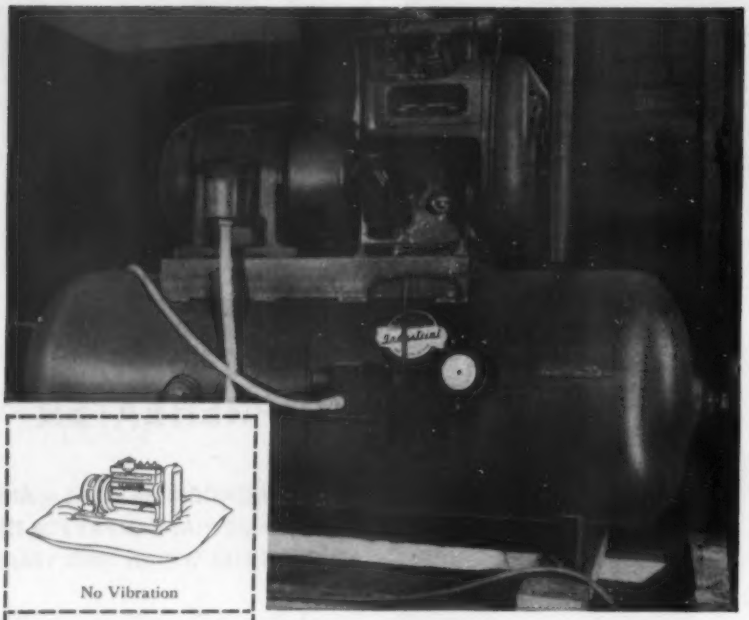
You get this double advantage with the Package Air Preheater because it's completely shop-assembled. And its compact design brings all the advantages of continuous regenerative heat recovery to boilers as small as 25,000 lbs of steam per hr—or as large as 250,000 lbs per hr.

There are other important advantages, too. Get the whole story by writing today for your free 14-page booklet with all the facts and figures.

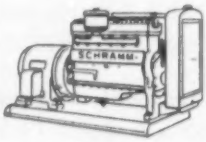
THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y

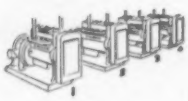
For more facts circle 624 on Reply Card



No Vibration

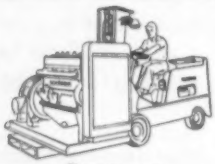


Compact

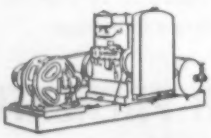


Unit System

No Elaborate Foundations



Easy to move



Complete Package

NO VIBRATION!

Schramm vibration-free compressors eliminate costly foundations

Balanced reciprocating parts will give vibrationless operation, lengthen compressor life. Any floor space will serve as a base—no need for special foundations. Schramm compressors don't even have to be fastened to the floor! And they're easier on your building, too.

Easy to move—change the location of your compressor whenever you need. Complete Package—all you need for your air requirements in a single package.

No elaborate foundation—eliminate this added cost with a vibration-free Schramm installation.

Compact—takes less space—put your Schramm compressor anywhere—take advantage of unused corners.

Unit System—use only as many compressors as you need now, expand your installation as required.

For complete information, write for Catalogs GC-57 and 5510, or see your nearest Schramm Dealer.

See the Yellow Pages for local Sales, Service and Rental of Schramm Air Compressors.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

665 North Garfield Ave. • West Chester, Pa.

For more facts circle 625 on Reply Card

NEW PRODUCTS

(Begins on page 176)

plied to a pressure pilot to reflect process temperatures causes it to reposition the main valve as changes in load require. Only air required is that needed to produce a loading, company points out, the temperature pilot can be fed through as much as 12 ft of ⅛-in. capillary tubing. Almost any range of temperature setting is available. Heater pressures to 90 psi can be had with 15 psi air loading pressures. Spence Engineering Co., Inc.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 251-252.

52—PIPE REPAIR CLAMP mends leaks quickly

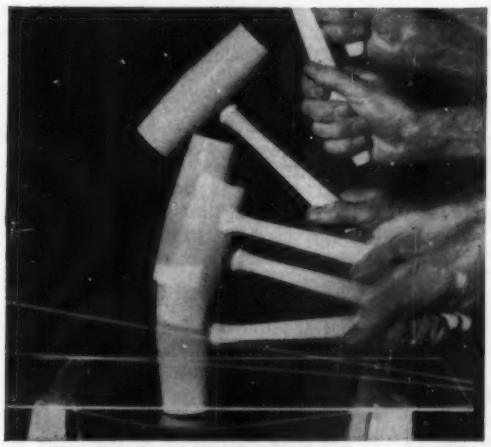
For pipe sizes from ½ through 8 in., widths of 3, 6, 9 and 12 in., the improved Marman Heavy-Duty Patchmaster incorporates a lug design which

lets the clamp conform to the contour of the pipe under high torque without biting into the pipe. The Buna N pad withstands high clamping pressures without extruding, it is pointed out, and is adaptable to oil, gas, water and steam. The clamp is announced as easy and quick to install, suitable for either emergency or permanent repairs of pipe leaks. Marman Div., Aeroquip Corp.

53—STEEL DOMES enclose column-free areas

This low-cost structural unit is designed to span large diameters—to the extent of 200 ft or more. Basic simplicity of construction makes for economical fabrication and high-speed erection. Sturdy in appearance yet

Plexiglas window glazing could have prevented this!



See how PLEXIGLAS "gives" under the force of a blow!

Sooner or later a plant window is likely to be slammed too hard . . . hit by a flying object . . . or bumped accidentally. The chances that it *won't break* are many times greater if it's glazed with PLEXIGLAS® acrylic plastic. Transoms, doors, windows, skylights and partitions need not be safety or maintenance problems for your company. PLEXIGLAS glazing is easy to install . . . resists chemicals and weather . . . drastically reduces replacement costs. Ask your Authorized Dealer. He's listed under PLEXIGLAS in the Plastics section of telephone directories in major cities.

In Canada: *Rohm & Haas Co. of Canada, Ltd., West Hill, Ontario*

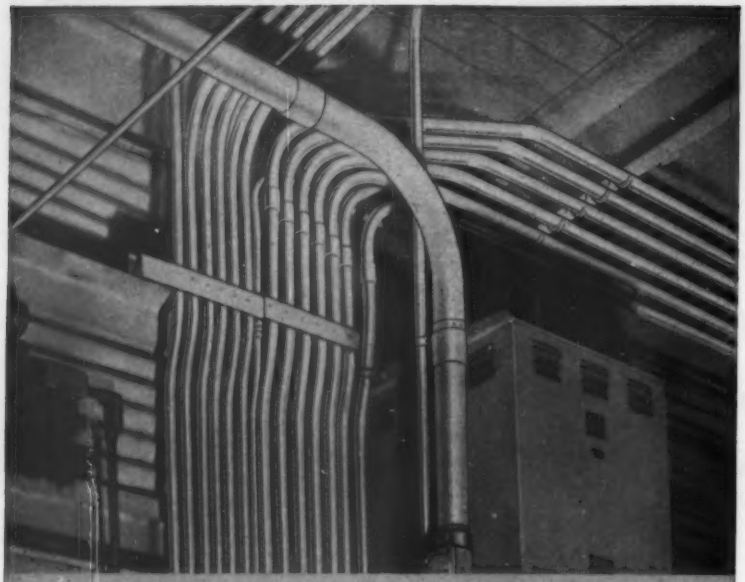
Chemicals for Industry

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

CALL YOUR AUTHORIZED PLEXIGLAS DEALER

PROMPT DELIVERY • TECHNICAL ADVICE • FULL RANGE OF SIZES AND COLORS



REYNOLDS ALUMINUM
Electrical Rigid Conduit
cuts installation and maintenance costs!

Reynolds Aluminum Electrical Rigid Conduit offers *five* important benefits: **1. LIGHTWEIGHT.** Aluminum conduit weighs approximately two-thirds less than steel conduit. Installation is faster, easier. **2. CORROSION-RESISTANT.** Aluminum cannot rust—ever—and is corrosion resistant to water, weather and most industrial atmospheres. There are no periodic protective maintenance problems, no rust on walls or surrounding fixtures. No rusting threads. **3. NON-MAGNETIC.** With aluminum conduit, voltage drop is reduced. Longer conduit runs or smaller conductors are possible. **4. EASY-WORKING.** Aluminum conduit bends and forms quickly and accurately to meet and by-pass obstacles found in many installations. **5. NON-SPARKING.** Aluminum will not spark from accidental contact with hard objects. Perfect for use in inflammable areas and atmospheres.

The Finest Products Made with Aluminum are made with REYNOLDS ALUMINUM

For more information and names of Reynolds Aluminum Electrical Rigid Conduit outlets, call your nearby Reynolds Sales Office or write *Reynolds Metals Company, Box 2346-EQ, Richmond 18, Virginia.*

Also write for descriptive brochure.

Watch Reynolds TV shows—"ALL-STAR GOLF" and "ADVENTURES IN PARADISE"—ABC-TV

For more facts circle 627 on Reply Card

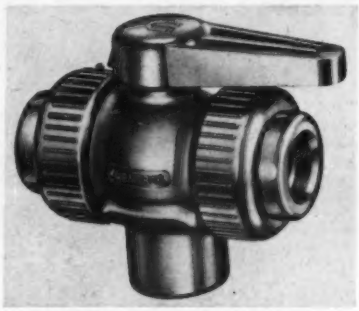
NEW PRODUCTS

(Begins on page 176)

light in weight, the dome offers either truss type of construction or the beam and girder type. It may be covered with corrugated aluminum or galvanized steel, and is suggested for auditoriums, storage buildings, industrial plants, warehouses, etc. Catalog 450 gives additional information. Shlagro Steel Products Corp.

54—PLASTIC VALVE handles corrosive liquids

Available in Types I and II polyvinyl chloride, these three-way valves are especially designed for systems handling corrosive liquids. No metal is used. Feeding to the inlet, flow can

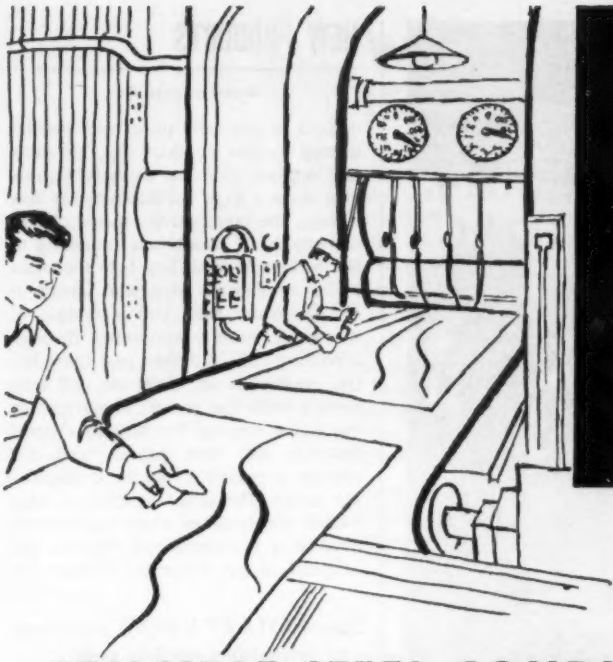


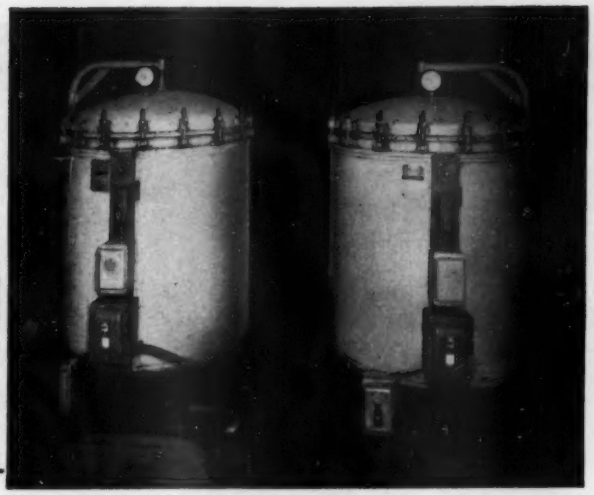
be diverted in either of two directions or a complete shut-off can be effected. The valve is presently available in various combinations of ½, ¾ and 1 in. port sizes. The valves have Teflon valve seats and quad type ring seals. All parts are replaceable, and union type end connectors are employed to permit rapid disassembly even after installation. Company says valves are compatible with all types of piping. Chemtrol.

55—ELECTRONIC SENTINEL protects boiler feedwater

To guard against contamination of boiler feedwater, this watchguard system involves electrical conductivity meters that keep a constant check of the conductivity of the water—a measure of impurities in it. If these exceed the danger level, an alarm rings to alert the operator, so the contaminated water can be dumped to waste. This manual system sells for about $375; an attachment to make the job automatic costs an additional $100 or more, depending on the size line used.

Boiler feedwater contamination is of special importance in the canning industry, where juices or cooking liquors can seep or be sucked into the steam lines. As explained, steam con-





These two CFC Honan-Crane Filters remove all foreign matter from oils used on cold roll reduction mill at Crucible Steel Company of America, Park Works, Pittsburgh. One filter is for use when rolling stainless steel, the other for titanium.

CRUCIBLE STEEL COMPANY KEEPS ROLLING MILL COSTS DOWN WITH CFC HONAN-CRANE FILTERS

Crucible Steel Company of America, Park Works, Pittsburgh uses CFC Honan-Crane Filters to effect substantial savings and improved product quality. By reducing downtime over 25%, they have increased productive man-hours accordingly. Rolling Oil savings have also resulted.

The CFC Honan-Crane "C" Type Filter uses a combination of filter media — inert cellulose and Cranite (fuller's earth). The cellulose filters out solid contaminants while Cranite removes the products of oil deterioration such as acids and asphaltenes. (Cranite also removes all traces of stain from the finished Crucible steel or titanium sheets.)

CFC Filtration Equipment provides positive protection against all types of oil contamination — for engine lube oils, quench oils, hydraulic oils, fuel oils, roll oils, cutting oils, turbine oils. For technical literature, write to Dept. PG

COMMERCIAL FILTERS CORPORATION
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

MICRO-CLARITY AT MINIMUM COST

Fulflo FILTERS — *with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.*

CFC FILTERS — *Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.*

For more facts circle 628 on Reply Card

Speed maintenance via air... Gardner-Denver air and tools

Waste no time. Put Gardner-Denver air power and tools on your maintenance team. Fast-acting Gardner-Denver air tools help your crew make the most of maintenance hours. Impact wrenches • air hoists • paving breakers • trench diggers • sheeting drivers • backfill tampers • utility drills • grinders • ratchet wrenches • concrete vibrators • nut setters.

Compact Gardner-Denver rotary portable compressors provide a steady, dependable supply of low-cost air. Rugged drawbar makes Gardner-Denver rotaries easy to move. Jackleg provided for quick setting-up. Big toolbox for air hose and tool storage. Write for information.

Gardner-Denver RP85-G (85 cfm) rotary portable air compressor

Gardner-Denver RP125 (125 cfm) rotary portable air compressor

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

For more facts circle 629 on Reply Card

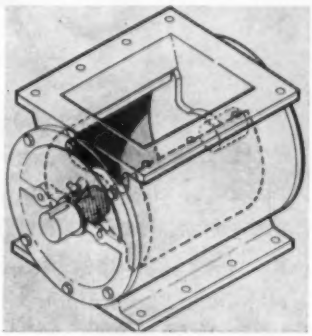
NEW PRODUCTS

(Begins on page 176)

densate is normally pure, and characterized by low conductivity. Minerals and organic acids in cannery liquors give them a high conductivity. In this system, the conductivity meter checks the quality of condensate returning to the boiler. A small line taps the main boiler condensate pipe well ahead of the feedwater tank and a sample of the water flows continuously through a cooling coil, and then past two electric probes in an electrode cell connected with the meter. Impurities in the water step up the flow of current between the two probes and the change is passed on to the conductivity meter. The latter contains a relay switch which closes when conductivity exceeds a predetermined amount, setting off alarm. Garratt-Callahan Co.

56—ROTARY VALVE with leak-stopping double seal

A double seal, in conjunction with close clearances is utilized to prevent leakage in the closed position of a rotary valve for use under silo deck slabs and bins. Advantages claimed for this valve include: an unrestricted



opening to permit free flow of pulverized materials (cement and lime) which have a normal tendency to arch; machining and aligning of trunion shafts to assure free movement of rotor to open and closed positions; and dust tight bearings. Sticking caused by packed material is said to be avoided by knife edges and V-slots at the end of rotor. These valves are adaptable to manual or remotely controlled motor operation. Fuller Co.

57—METAL SUPPORT for outlet box mounting

Catalog 50 Box Brace is a hook-styled metal support designed to make possible more rigid installation of electrical outlet boxes on wall studs or ceiling joists. Where used on ceiling

For more facts circle 630 on Reply Card——→

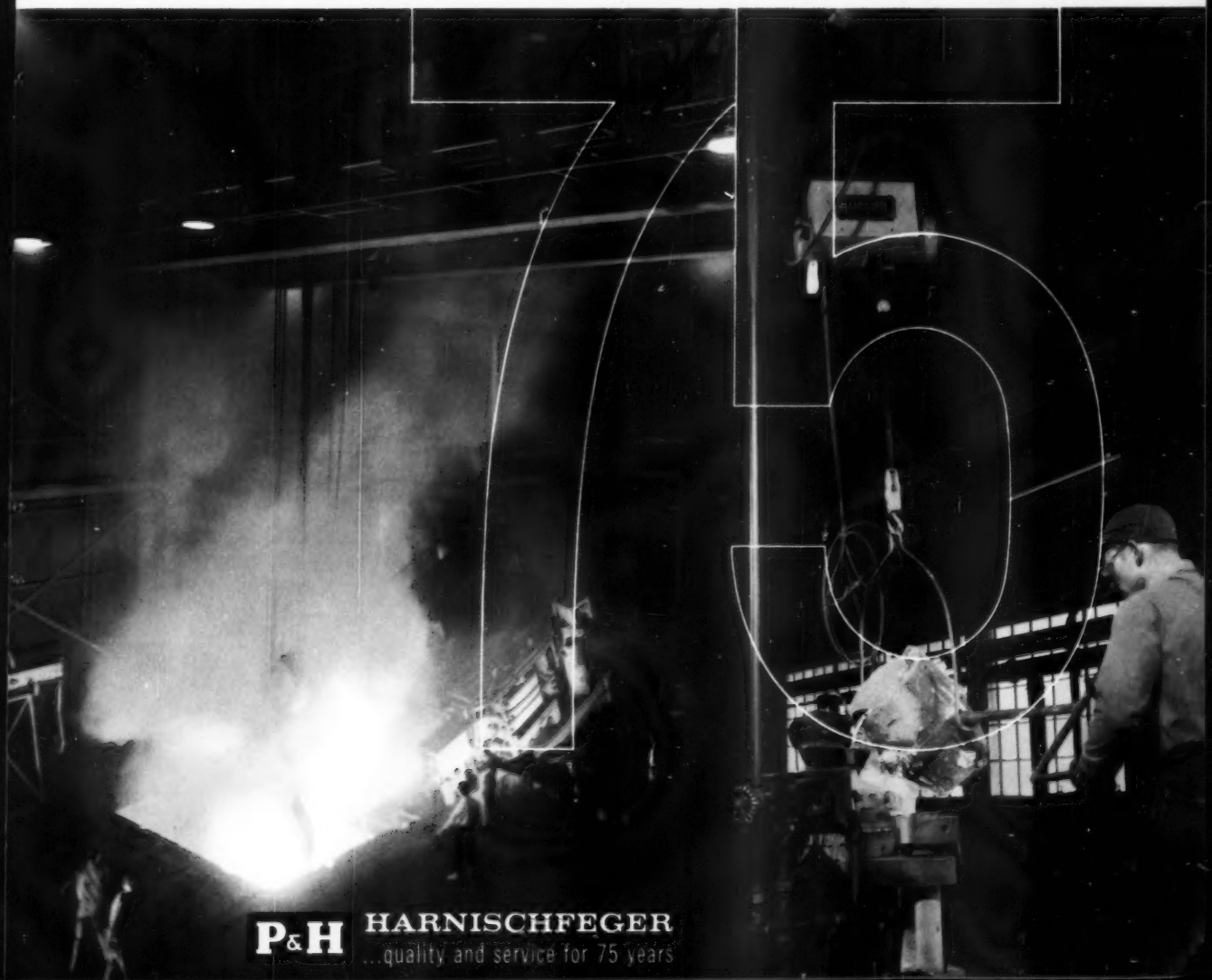
WHAT'S IT TO YOU IF P&H IS *75* YEARS OLD?

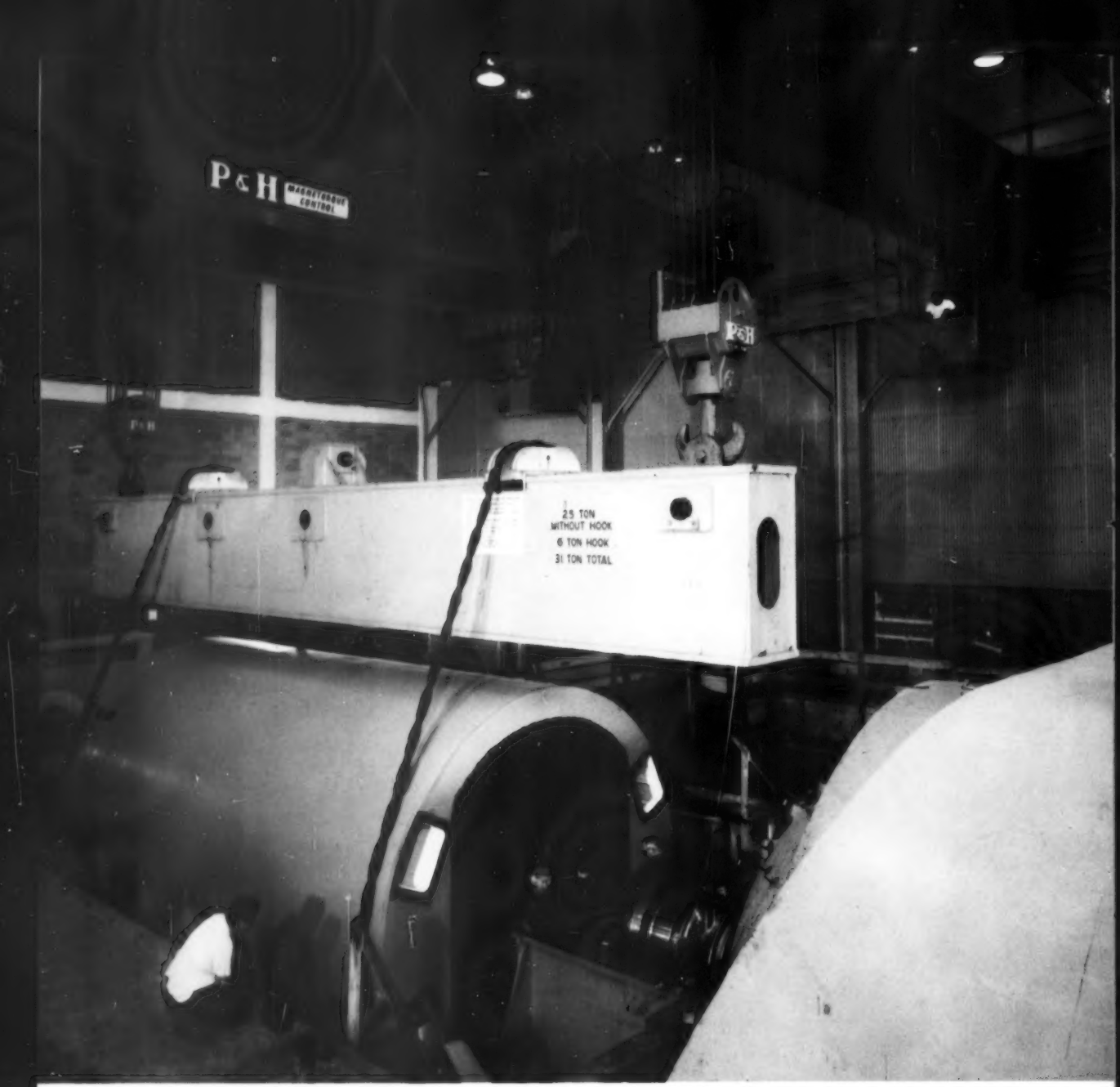
Some companies point with pride to their long years of experience. Perhaps they believe that age alone is a compelling reason for customers to choose their product.

But at Harnischfeger Corporation we don't believe you buy leadership in any field just by putting in time. You have to go out and win it — with a product that's better than the other fellow's, with service the customer can depend on. And once you've reached the top, you can't stand still.

How do you stay on top? The answer is you work at it, year after year. You study field reports, correct mistakes, make design improvements as you go along, explore new ideas, develop new products, testing and retesting them under every imaginable condition until you *know* they work. Result? Harnischfeger has led the way in crane and hoist design with the really big "firsts" — Magnetorque, Electronic Stepless Control, RCD hoist brake, Balanced Design Hevi-Lift hoists, just to name a few of the most recent.

We've been at it for 75 years now, and the score is pretty impressive. Harnischfeger has made, sold, and installed more overhead cranes and hoists than any other company in the world. Isn't experienced leadership like this an important consideration when you purchase your next crane or hoist? Let Harnischfeger bid on *your* next inquiry — and prove it! Harnischfeger Corporation Milwaukee 46, Wisconsin.





FOR EVERY APPLICATION, THERE'S ONE CRANE OUTSTANDING...

IN POWERHOUSES: You're looking at a giant stator being carefully "hairlined" into place at a new Midwestern powerhouse . . . a job this pair of herculean P&H cranes handles with precision *Magnetorque* control despite the fact the load exceeds 200 tons.

P&H's *total* control of massive loads permits faster, safer moves . . . and this is true whether you make occasional lifts in powerhouse service or constant lifts in production. Whatever your service, this kind of fast, safe, dependable performance means lower maintenance, operating and handling costs.

What's more, when P&H cranes become part of *your* material handling picture, you're assured of single-source responsibility for every structural, mechanical, and electrical part for the life of the crane. Service is quick and competent . . . straight from Harnischfeger, the world's largest crane manufacturer. Why not investigate the possibilities Harnischfeger offers to meet your job requirements today? The whole story is waiting for you in Bulletin C-6. Write for your free copy to Dept. 110, Harnischfeger Corp., Milwaukee 46, Wisconsin.

P&H

HARNISCHFEGER

...quality and service for 75 years

OUR 75TH YEAR

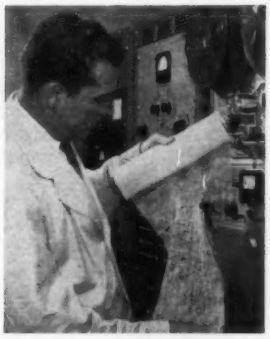
NEW PRODUCTS

(Begins on page 176)

joists, the brace provides secure accommodations for fixture hanging. It employs the principle of counterleverage to withstand pressures applied on the box. The 14-gage steel brace comes in quantities of 50 units, 500 to a standard package. Steel City Electric Co.

58—DUSTING FABRIC is non-woven, scratch-free

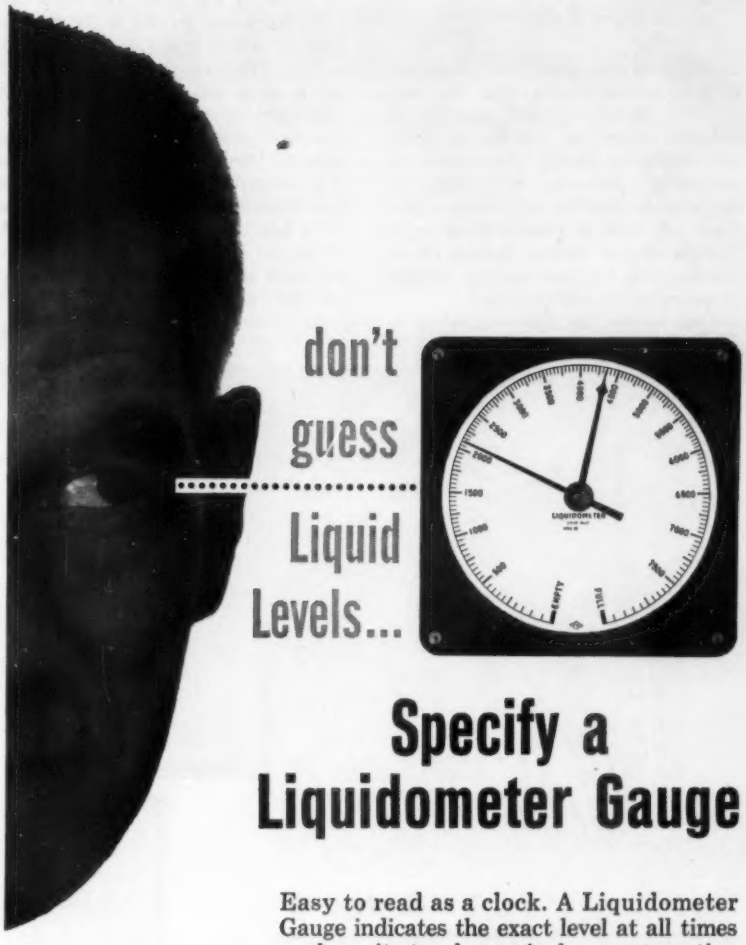
Scotch Brand Dusting Fabric 550 is designed to pick up and hold dust, and can also be used to provide a porus protective cover for objects requiring ventilation while stored. Neither cloth nor a paper, this material can collect dust from even detailed precision instruments, electronic



equipment and cabinets, company states. A rayon-type fabric, which can be used several times without losing effectiveness, it consists of thousands of dust-collecting pockets. Non-woven, it is formed by extra-long rayon fibers, bound together with a synthetic, odorless, unifying resin. Although this resin attracts and holds dust, the fabric is not oily or sticky, manufacturer points out, and it contains no silicones or corrosive chemicals which could remain as a film residue on dusted surfaces. It is said to be softer than many facial tissues. The fabric comes in 30-yd rolls, 12 in. wide, with tearing perforations 18 in. apart. A roll costs around $2.00, makes 60 dusters. Minnesota Mining and Mfg. Co.

59—CONTROL VALVE has low pressure drop

In the Straight-Flow Control Valve, flow moves in a direct line through the valve at all throttling positions, it is announced, and this greatly reduces pressure drop and friction loss while giving infinitely variable throttling. K factor of this valve is said to be only 0.35. Its principal advantage



Specify a Liquidometer Gauge

Easy to read as a clock. A Liquidometer Gauge indicates the exact level at all times ... shows it at a glance. And gauge operation is completely automatic—as far as 250 feet from the tank—without need for auxiliary power of any kind.

A Liquidometer Tank Gauge measures virtually any liquid. It's simple to install—requires no maintenance. Many have provided over 30 years of efficient, dependable service. All are approved by Underwriters' Laboratories and Factory Mutual.

Whether your gauging needs require an automatic Liquidometer Gauge, a hydrostatic Levelometer or a tank-site-indicating Direct Reader, you'll get the best by specifying Liquidometer. For complete details write Dept. B.

Since 1920 ...of proven quality

THE LIQUIDOMETER CORP.

LONG ISLAND CITY 1, NEW YORK

For more facts circle 631 on Reply Card

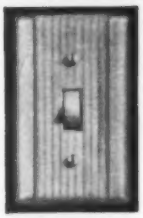
(Begins on page 176)

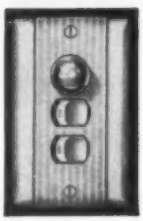
is ability to pass more fluid or gas for a given pressure and with less turbulence, letting a greater capacity be obtained from an installation without changing piping dimensions or increasing pressure. Resistance to clogging is another advantage cited; since all flow is concentrated in a triangle-shaped orifice, instead of an annular one, it allows passage of larger particles of solid material.

This method of flow regulation is accomplished by raising or lowering the stem which is placed at a selected angle to the flow. The stem has a 90-deg milled groove in the tip, the apex of which is parallel to flow direction. The stem does not rotate, but moves up or down in an angle. As the stem rises, a larger section of the V-groove is presented as flow area. Flow does not deviate from a straight line, it is pointed out, causing almost zero fluid friction and zero turbulence. The valve has an outside stem and bonnet. It can be had in carbon steel, stainless steel and bronze. Pressure ratings are 600 to 10,000 psi; sizes, ⅛ to 4 in. General American Valve Co.

Built to take it... Indefinitely!

THE NEW P&S *ROCKER-GLO SWITCH*





Here is a switch that can take it . . . and come back for more. Install Rocker-Glo in the most used and abused stations in institutional, commercial or factory building. Then watch its continuous, perfect, satin-smooth performance.

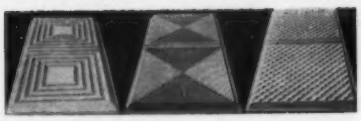
P&S Rocker-Glo switches are AC switches, designed to be used at full current ratings on tungsten filament and fluorescent loads – one does the work of two AC-DC switches for controlling fluorescent fixtures. Rocker-Glo can be used anywhere old-style toggle switches are used. Rocker-Glo is sturdily constructed. Its rugged, wall-hugging rocker is not subject to breakage from accidental blows as is the case with ordinary switch handles. It's built to withstand punishment ordinary toggle or specialty switches cannot take – changes no wiring habits. Single Pole and Double Pole switches are indicating – you can tell when they're on or off.

For more information write Dept. PE-1159

Available in Despard interchangeable type, Despard Type mounted on strap and narrow rocker for tumbler switch plates. A specification grade switch, 15 and 20 amps. 120/277 volts AC.

P&S PASS & SEYMOUR, INC.
SYRACUSE 9, NEW YORK
60 E. 42nd St., New York 17, N. Y. 1440 N. Pulaski Rd., Chicago 51, Ill.
In Canada: Renfrew Electric Co., Ltd., Toronto, Ontario

MAKE THE COMPLETE JOB COMPLETELY P&S
For more facts circle 632 on Reply Card

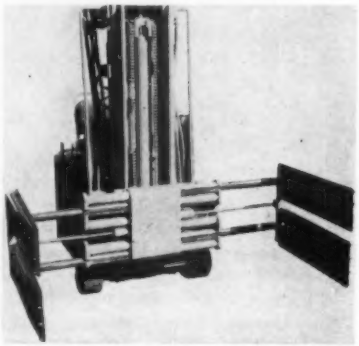


60—DIFFUSER PANELS in compatible designs, new size

Compatible diffuser designs in 2-by-4 ft sizes, matching the standard 2-by-2 ft diffusers, now make possible variations and economies previously impossible. The new panels eliminate the need for center bars, and according to company, have anti-sag construction. Diffusers are available in single and double dirt-shield panels. Double dirt-shield panels consist of two plastic sheets placed apart and fastened around perimeter with white or bright metal edge. Dirt or stains are not visible. Panels are light stable, high impact, white 0.015 polystyrene or vinyl. Lightonics.

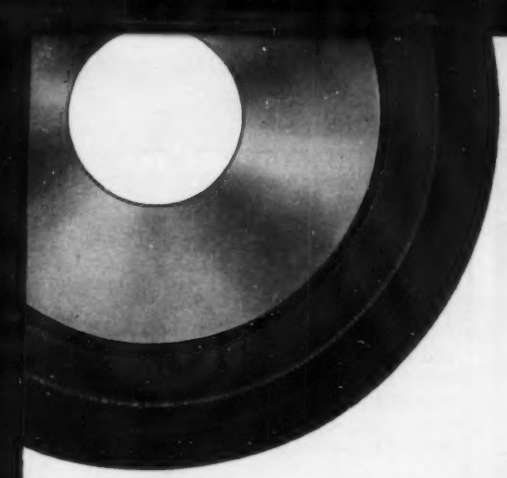
61—TRUCK with side shift grab, versatile arms

The electric SpaceMaster Model J with Cascade Clamps and Little Giant Multi-Purpose Arms is designed to handle almost any type of non-palletized load. The multi-purpose arms handle unit loads of drums, cartons, crates, bales, rolls, etc. The arm gripping surface is smooth or rough-top rubber bonded to steel sheets which are screwed to the plates. Lewis-Shepard Products, Inc.



62—RADIANT HEATERS give "portable sunshine"

Instant infra-red heat that warms the man and the job but not the air is reported possible with these portable gas-fired radiant heaters. Operated outdoors or in, on bottled propane gas, the heaters are designed to produce sunshine-like warmth at low cost. Because infra-red rays, like rays of light, can be directed and controlled, they can be concentrated on specific areas by polished parabolic reflectors without heating the surrounding air.



ANOTHER OF THE GARLOCK **2,000**

Metal plates, spot-welded together, provide cup with backing entirely of metal ("A"), are stepped to give metal to metal contact ("B").

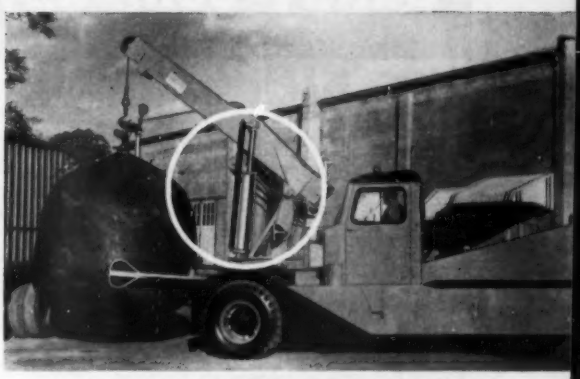
Where SERVICE is TOO ROUGH for ORDINARY CUPS...

Garlock Metal-Backed Cups offer positive sealing

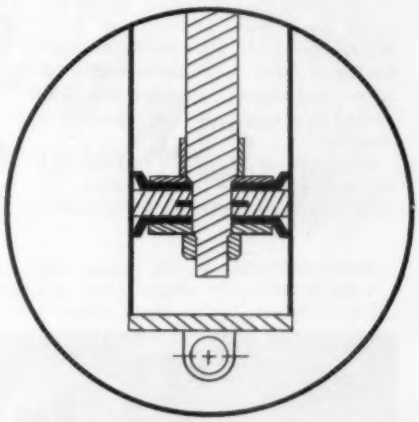
A new, patented Garlock Cup construction provides metal reinforcement across the back and through the center of the cup. Under pressure, they actually support themselves without extruding at the heel. And, by bolting the cups to the back-up support of the piston assembly, a metal-to-metal contact is established—once tightened, it never loosens . . . eliminates compression loss.

Garlock Metal-Backed Cups help assure safe, smooth hydraulic operation of cylinders on heavy duty equipment such as the hydraulic crane illustrated at right.

Available in widely-used fabric, or in synthetic rubber. Garlock Metal-Backed Cups come in standard sizes ranging from 1½" to 14½". They are another important part of the Garlock 2,000 . . . two thousand different styles of packings, gaskets, and seals for all your needs. Let your Garlock representative recommend the best style for your application. Call him, or write for bulletin AD-145.



Garlock Metal-Backed Cups are used for dependable operation of hydraulic cranes manufactured by Grove Manufacturing Company, Shady Grove, Pa. Circle indicates hydraulic cylinder on which cups are used.



THE GARLOCK PACKING COMPANY, Palmyra, N.Y.

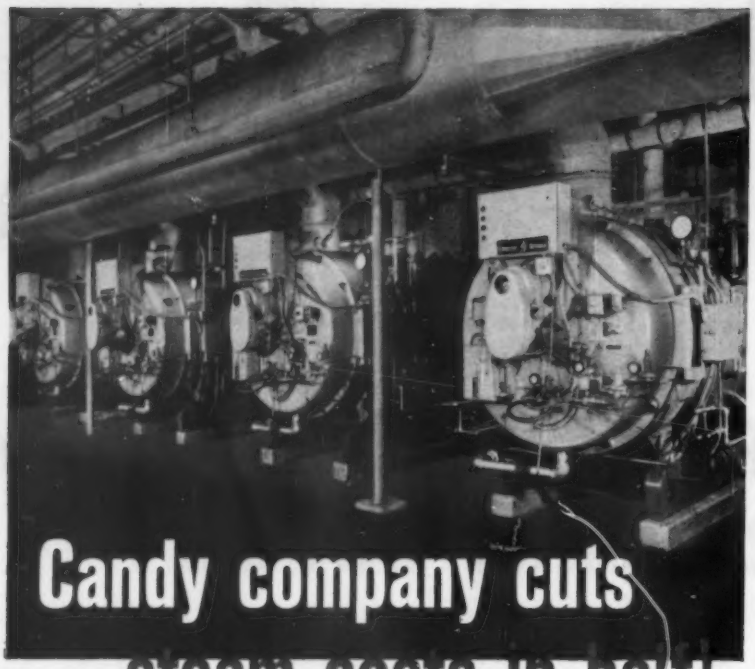
For Prompt Service, contact one of our 26 sales offices and warehouses throughout the U. S. and Canada.

GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products

Canadian Div.: The Garlock Packing Co. of Canada Ltd.—Plastics Div.: United States Gasket Co.

For more facts circle 633 on Reply Card



Candy company cuts steam costs in half!

At Edgar P. Lewis & Sons, Inc., Malden, Mass., four Cleaver-Brooks packaged boilers assure a constant supply of steam at constant pressure — result is higher candy quality at lower cost

This leading New England confectioner formerly purchased its steam at a cost of $80,000 a year. Mr. Frank Reis, plant engineer, reports that since installation of four Cleaver-Brooks combination gas/oil boilers, operating costs have been reduced by half. What's more, Mr. Reis points out that having a truly dependable source of steam at constant pressure has improved the quality of the company's candies.

Steam is used for both heating and processing. Two of the CB boilers are high pressure—steam produced at 120 lbs. is piped to kettles where the candy is cooked. A pair of low pressure CB boilers operate 24 hours a day furnishing heat for the five plant buildings. Low pressure steam is also used in candy drying operations.

Day-in and day-out dependability is one feature that makes Cleaver-Brooks packaged boilers tops with food processors. Cleanliness, lower installation and operating costs, [illegible] efficiency and free [illegible] service are other big plus factors. For complete information on CB boilers (130 models, [illegible] hp, gas, oil or gas/oil fired) call your representative or write Cleaver-Brooks Company, Dept. M. 604 E. Keefe Ave., Milwaukee 12, Wis.

WE CAN DELIVER NOW!

Cleaver Brooks
ORIGINATOR AND LARGEST PRODUCER OF PACKAGED BOILERS

SWEET SAVINGS — Jelly strings, marshmallow eggs, chocolate peanuts are just a few of the quality candies made by Edgar P. Lewis & Sons, Inc. Battery of four Cleaver-Brooks boilers keeps steam costs down . . . keeps candy quality up.

For more facts circle 634 on Reply Card

NEW PRODUCTS

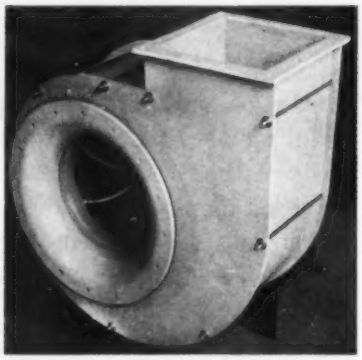
(Begins on page 176)

The infra-red rays are produced by burning gas on the surface of a ⅜-in. thick ceramic mat containing 200 holes per square inch. Available in three sizes, the smallest weighs only 8 lb, has a rated input of 16,000 Btu and is said to operate for less than 5 cents per hr. Two larger sizes are mounted on vertical rod attached to a wheeled propane bottle carrier. Perfection Industries, Div. Hupp Corp.

Reader Service Cards on pages 251-252 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

63—SOLID PLASTIC FAN for handling corrosive fumes

All parts of the Rigivin Fan No. 20 in contact with fumes, including the housing and wheel, are of solid, un-



plasticized polyvinyl chloride, it is stated, and are unaffected by corrosive conditions. The fan has heavy, oversize, outboard bearings and is designed to operate at well below its critical speed to assure continuous, uninterrupted service life. The Rigivin Fan can be had in wide range of standard sizes. Heil Process Equipment Corp.

64—REGULATOR keeps volume output constant

This constant volume regulator is designed to provide fully automatic regulation for control applications where a constant volume output of gas or air is necessary regardless of fluctuating pressure drop. Capacity is controlled by micrometer adjustment to assure

At Idlewild International Airport

HORTONSPHEROID

stores fuel for $6,000,000 heating system

CB&I Structure complements beauty and efficiency of new facilities

Engineers for the Port of New York Authority wanted both beauty and utility when they specified this 5,000-barrel Hortonspheroid® for the storage of fuel to serve New York International Airport's new central heating plant. High temperature water, generated in the attractive plant, heats all airport central terminal buildings to eliminate duplication of equipment, service and save valuable space. A second pipe system carries chilled water year-round.

Hortonspheroids are the natural way to store volatile liquids safely and stop evaporation losses. They have also been used for the storage of water. Their beauty, utility and high performance standards are another example of how CB&I's complete design, fabricating and erection facilities are helping modern engineers save time and effort.

Write for our new bulletin: CB&I FIELD SERVICES

E54CB

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston • Kansas City (Mo.)
New Orleans • New York • Philadelphia • Pittsburgh • Salt Lake City
San Francisco • Seattle • South Pasadena • Tulsa
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, GREENVILLE, PA. and at NEW CASTLE, DELAWARE.
In Canada: HORTON STEEL WORKS LTD., TORONTO, ONTARIO
REPRESENTATIVES AND LICENSEES:
Australia, Cuba, England, France, Germany, Italy, Japan, Netherlands, Scotland

CB&I

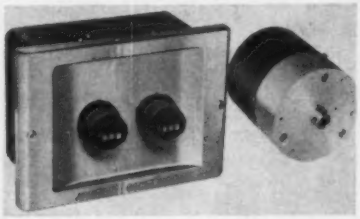
(Begins on page 176)

accuracy of desired output. This output volume is from 5.0 to 180 SCFH at pressure differentials from 1 to 25 psi. George W. Dahl Co., Inc.

65—ELECTRONIC SWITCH senses, limits position, level

Designed to sense and remotely limit position, weight, level or pressure, this electronic limit switch is introduced for applications where one or more trip points must be frequently reset as in sequencing and programming. Limits are set to accuracies of 1/5 of 1 percent for standard units, it is stated, or to one part in 250,000 for special systems. This switch is used for setting machine tool limits, for setting trip points on batch weighing scales or load cells, for adjusting pressure limiting devices, and for other position or load limiting functions. Component and installation costs are claimed low, particularly for applications where several trip points are to be set, where reset is frequent, where high accuracy is required.

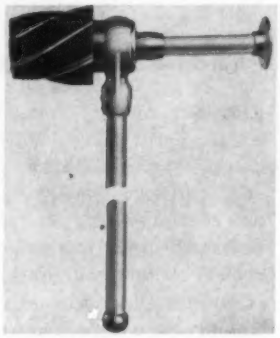
There are two components: setter and sensor. One or more limit points are set in on individual dials or counters of the setter (shown left). Each dial sets a potentiometer or resistor which serves in one leg of a bridge



circuit. The sensor varies a resistance in the other leg of this circuit. Usually a matching potentiometer, the sensor may be any resistance varying transducer. A frequently used sensor is the shaft mounted unit (shown right) which includes built-in potentiometer and gear trains. The setter circuit consists of a transistorized bridge-amplifier on a printed circuit board and enclosed in a steel cabinet. The Jordan Co., Inc.

66—HAND REAMER for 3½ to 4 in. pipe, conduit

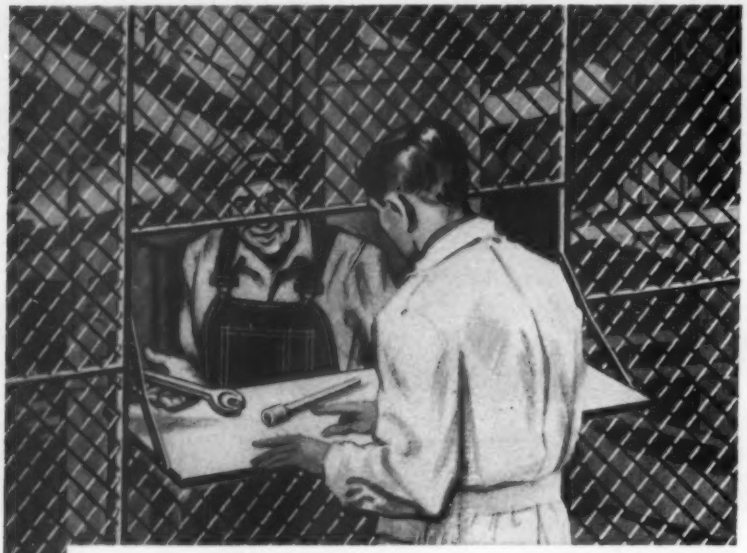
The No. 354 Spiral Reamer is designed to smooth the inside of 3½- to 4-in. pipe and conduit, and eliminate hand filing. Ratchet handle speeds



work in tight quarters, company points out, and seven spiral cutting edges pare off metal. Hand grip has large pressure plate for comfortable application of body pressure when necessary. Hollow reamer construction reduces weight for easy handling. Hardened tool-steel cone is removable for sharpening. The Ridge Tool Co.

67—ICE MELTER works faster and goes farther

Melt Extra is claimed to be more economical to use and possess greater active bulk than similar products. Of



REDUCE THEFT LOSSES!

Do you know that employee theft of company-owned tools, supplies, etc. totals more than 200 million dollars per year? That's right! . . . and *your* company is paying a portion of that "bill". That's why you'll find low-cost Phoenix wire mesh partitions one of the best investments you can make. For simply by erecting Phoenix partitioning around your tool rooms, store rooms and other such areas, you will *substantially* decrease the "mysterious disappearance" factor that even now is costing your company untold sums of money. And your savings in reduced theft losses will, *in fact*, pay for your Phoenix partitioning many times over. Want more details? Write today for the new Phoenix bulletin on Wire Mesh Partitions. It's yours for the asking!

SINCE 1885 ONE OF THE NATION'S LEADING MANUFACTURERS OF WOVEN WIRE PRODUCTS

PHOENIX WIRE WORKS, INC.

1958 E. KIRBY • DETROIT 11, MICHIGAN

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For more facts circle 636 on Reply Card

Actual X-ray photo of SKIL Model 75 Heavy-duty ¼ inch drill.

LET'S FACE IT... THE MOTOR MAKES THE DRILL

This is not to minimize the importance of bearings, gears, chuck, switch and housing.

But the fact remains... the motor makes the drill.

And the compact, ¼-inch Skil Model 75 drill has the motor to drill holes in all kinds of materials . . . and drill 'em faster.

Here's proof: In a controlled laboratory test, with 350 pounds pressure applied vertically, a Model 75 pierced ¼-inch steel in 1.26 seconds. Comparable drills stalled out with only 250 pounds of load.

Yet with all its power the Model 75 is more compact, weighs less than most comparable ¼-inch drills. Comes in 7 models with speeds to match any material requirement exactly.

Ask your Skil distributor for a demonstration. Or mail coupon.

PS: Low cost standard duty Model 138 Skil ¼" drill also available for lighter duty work.

SKIL ...AND SKILSAW POWER TOOLS

FREE! 58-PAGE SKIL INDUSTRIAL TOOL CATALOG

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☐ Please send name of nearest distributor.

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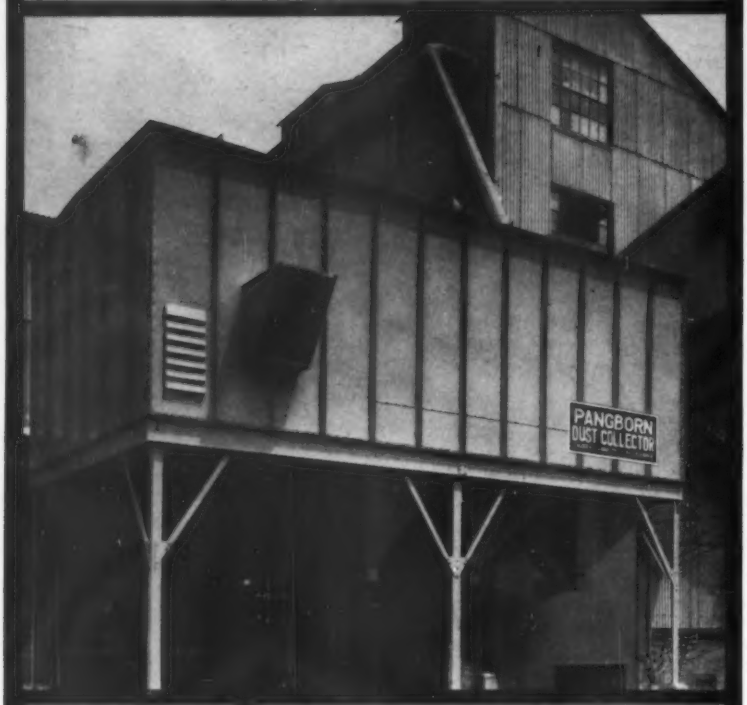
THOROUGH DUST COLLECTION!



Pangborn Dust Control eliminates float dust at Mexico Refractories

At Mexico Refractories Co., Div. of Kaiser Aluminum and Chemical Corp., Frostburg, Md., at least 7,000 tons of raw material a month pass through crushing, grinding and other dust-generating operations. To control and collect the resulting vast quantities of dust, two Pangborn Dust Collectors were installed.

These units provide thorough dust collection . . . every dust particle collected is returned to the process. As a result of Pangborn Dust Control, the air is free of float dust and good working conditions prevail. Although the company does not keep records on the amount of dust collected, it has found that salvage has been substantial. Mexico Refractories is highly satisfied with the effective, economical and trouble-free performance of Pangborn Dust Control.

If dust is a problem in your plant, talk to the Pangborn man in your area or write PANGBORN CORP., 3200 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control and Blast Cleaning Equipment—Rotoblast Steel Shot and Grit.*®

Pangborn CONTROLS DUST

For more facts circle 638 on Reply Card

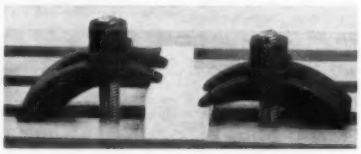
NEW PRODUCTS

(Begins on page 176)

aerated crystalline chips that generate heat immediately upon contact with ice and snow, Melt Extra is reported to provide 35 to 40 per cent more covering capacity than many pellet type melters. White in color, Melt Extra won't discolor or damage surfaces on which it is used, says manufacturer, and it leaves no residue to track into buildings. You apply it by hand, scoop, shovel or spreader. Chem Industrial Co.

68—HOLD DOWN CLAMPS are quick, easy to use

Insta-Clamps are designed to clamp without shims to the full capacity of the clamp—without need for vises on many jobs. They are made of heavy steel forgings and steel washers supplied with each clamp serve to dis-



tribute pressure evenly and locate the pressure tangent point automatically. Two or more of these clamps lock any work piece in position, manufacturer states; they won't tip over when clamping narrow grooves, ledges or corners, and even one prong in position is strong enough to hold the work piece. Insta-Clamps can be applied to fixtures and jigs used on universal and vertical mills, jig borers, punch presses, planers, drill presses. Insta-Clamp Co.

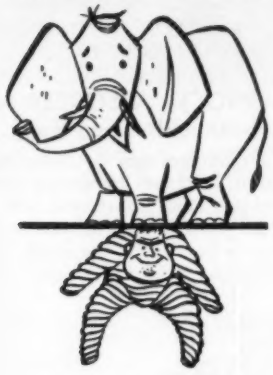
69—TROLLEY SYSTEM has its live parts covered

All live parts are completely covered in the Penrose Trolley System, company announces, and it is adaptable to new or existing installations—without plant shutdown. Installation is accomplished by clipping the Neoprene duct to the wire. The entire trolley wire is covered by this flexible duct which has a self-closing slot through which the trolley shoe passes. Current is carried by insulated jumpers. The contact shoe is supported on an insulator on the end of the arms, and guarded by a Neoprene cover. Sections may be installed without service interruption.

Use of the Neoprene ducts enables use of straight or curved runs without risk of cracking, expansion, contraction or combustion, it is pointed out; and the system may be used out-

Tuffy Tips —on safe use of Slings and Hoist Lines

How Much Lifting Should be Done by Muscles?



Individual differences between workers make this a hard question to answer categorically. For a rule of thumb: the United States Department of Labor recommends men should handle no more than 50 pounds; women no more than 25 pounds. Of course, this is for men and women of average size and weight, in normally good physical condition. To remove all doubt, mechanical lifting and hoisting equipment should be used for all loads not comfortably lifted by muscles.

Rules to Remember For Wire Rope Safety

1. **BREAK IN** new wire rope with care. Don't use it at maximum load capacity until it is broken in beyond a doubt.
2. **OBSERVE SAFETY FACTORS.** Usually the rated load factor is 4 to 5. The Wire Rope Technical Board says 5. Elevators require 10. Static ropes — not hoisting, dragging or actively operating —may have a rated load factor of 3.
3. **LUBRICATION IS IMPORTANT** for safety, as well as for pliability and friction-fighting. Rust makes ropes brittle, and likely to break without warning. Thorough lubrication keeps out rust.
4. **INSPECT ROPES** and slings frequently for signs of serious wear. Careful inspection may save costly work stoppage or serious injury.

Sling Fittings Are Important Safety Aids

Proper fittings serve the dual purpose of greater safety and longer sling life. Fittings used on Tuffy Slings are made in more than a score of types, for every kind of service. Two of them are shown here:

(1) **EYE HOOKS:** Fittings for Tuffy Slings are selected on the basis of providing the complete unit assembly with equal breaking strength overall. Eye hooks are forged steel, weldless and designed for efficiency.

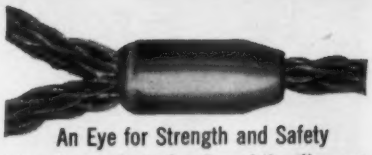
(2) **NEWCO SAFETY HOOK:** People can forget to lock a hook gate. This safety hook always remembers. A load cannot be lifted without the gate (yoke) automatically locking. To be opened, it must be manually pressed against a compression spring. We also supply this safety hook with a swivel eye for the sling. The name: Newco Safety Swivel Hook.

Tuffy Hoist Line: Stalwart Companion of Tuffy Slings

Tuffy Slings and Hoist Lines work as an efficient team on all types of overhead cranes, derricks and clamshells. Like all Tuffy Special Purpose Wire Ropes, Tuffy Hoist Line has the

right combination of strength, flexibility and toughness for greatest safety and longest service life. Use this Tuffy "team" to cut hoisting costs in every type of materials handling.

Your Tuffy Distributor Offers the Most in Service and Savings



An Eye for Strength and Safety

Slipped over the tuck-splice of the sling eye, and pressed on under tremendous hydraulic pressure, the steel ferrule holds so tight that it gives the eye splice full strength of the fabric. What's more, it is smoothly tapered to meet the main body of the sling. No abrupt edges or rough projections to injure hands and slow down work. The extra life, efficiency and safety of Tuffy's pressed-on ferrule is yours at no extra cost.

Tuffy Leads with Two Lives

"Tuffy Slings give us double the service life of ordinary slings." So reported one of the big steel corporations. The secret of Tuffy's extra life: the patented 9-part machine-braided fabric. It provides a combination of flexibility and strength never possible with ordinary wire rope.

Tuffy Takes the Danger Out of Kinks

In the first place, Tuffy Slings are not likely to kink at all. Try to kink a Tuffy. Even if you succeed with the aid of a vise, the kink can be easily straightened out with no material damage. Tuffy's machine-braided fabric won't take a "set" or deformity under the toughest of ordinary working conditions. So the danger of rope-weakening kinks is eliminated.

FREE! New Tuffy Sling Handbook

Revised and enlarged edition of famous sling manual. Covers all the bases in selection and use of Tuffy Slings and sling fittings. Gives types, dimensions, weights and rated loads. Even includes safety-approved standard signals used in operation of various equipment. Send for your free copy now. Write **Union Wire Rope Corporation, 2272, Manchester Ave., Kansas City 26, Mo.**

. . . Specialists in high-carbon wire, wire rope, braided wire fabric and stress relieved wire and strand.

UNION Wire Rope

S1

Subsidiary of ARMCO STEEL CORPORATION

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Southwest Steel Products

New steels are born at Armco

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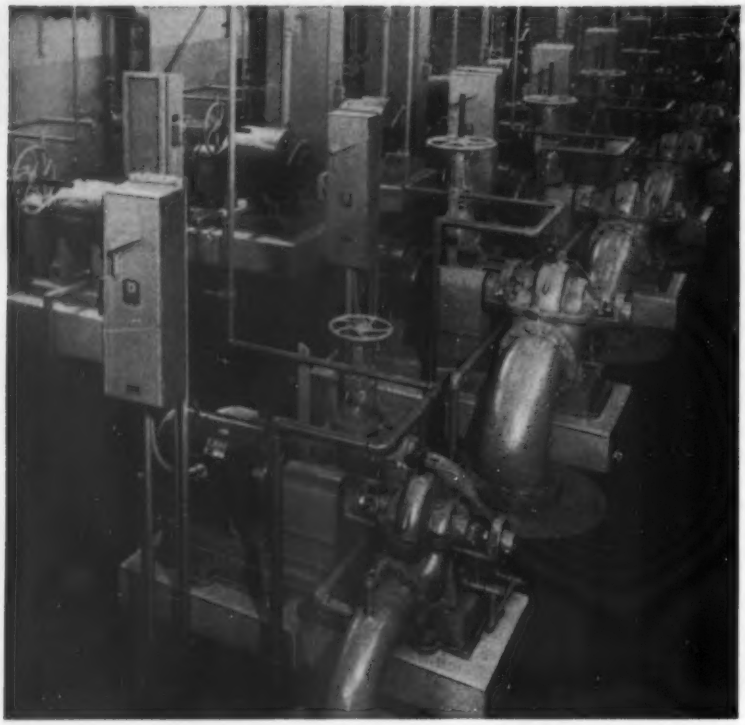

the bigger your pumping problems... the better your reasons for giving them to **WHEELER-ECONOMY**

Ford Motor Company's new Chicago Heights (Ill.) stamping plant had three big pumping problems, and Wheeler-Economy solved them all! Two Double-Suction Pumps keep the plant's reservoirs filled with a million gallons of water. Ten other W-E Pumps are used in Ford's recirculating process water system. And a pair of Double-Suction Pumps supply water for the company's space heating system.

C. H. Wheeler's Engineering Department, and production and test facilities, are all geared to the solution of one-of-a-kind pump problems. See your representative or write direct whenever you need pumps or expert pump advice.

Economy Pump Division

C. H. WHEELER MFG. CO.

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Whenever you see the name C. H. Wheeler on a product, you know it's a quality product

Centrifugal, Axial and Mixed Flow Pumps • Steam Condensers • Steam Jet Vacuum Equipment • Marine Auxiliary Machinery • Nuclear Products

For more facts circle 640 on Reply Card

You'll find two postage-free Reader Service Cards on pages 251-252. Use them for ordering product information—just circle item numbers of the catalogs or bulletins you would like to have. You may also use the cards for requesting advertised catalogs.

NEW PRODUCTS

(Begins on page 176)

side as well as inside because weather or temperature changes have no effect on the ducts. Shoe action keeps ice from forming on conductor and serves to automatically de-ice the safety duct. Northbrook Products, Inc.

70—SHOCK ABSORBER uses both rubber and steel

The Brandon Cushion Chain Shock Absorber combines cushioning properties of a rubber compound with the strength of alloy steel chain. The rubber is bonded to the chain (with links in contracted position) under

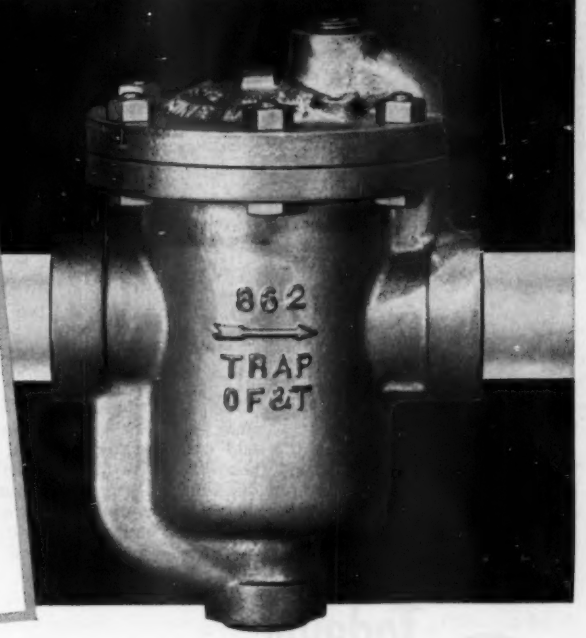
heat and pressure, and the design is such that the rubber is under shear, compression and tension in different sections of the shock absorber as it functions under load. Because of its simplicity, this shock absorber is said to require no maintenance itself—and to reduce maintenance and increase safety factor of machinery parts, lifting, towing or load binding apparatus subject to sudden jerks or accelerated load fluctuations or vibration. Brandon Equipment Co., Inc.

71—POWER CABLE is insulated for higher voltage

This 28-kv power cable with 33/64-in. thick butyl-rubber insulation is introduced as an answer to higher voltage requirements. In addition to its heavy insulation, the cable has a 7/64-in. Neoprene outer jacket, an outside diameter of 2.3 in. and weighs

Here are the steam traps designed especially for heating systems . . .

ARMSTRONG OPEN FLOAT AND THERMOSTATIC STEAM TRAPS



Engineered for low pressure intermittent service where large amounts of air accumulate while steam is off

Armstrong O.F.&T. Traps make it possible for heating systems to deliver the efficiency they were designed to deliver. They are ideal for low pressure unit heaters, preheat and reheat coils, converters, hot water generators, etc.

Advantages to the user:

BIG AIR HANDLING CAPACITY—Thermic vent handles large amounts of air in system when steam is turned on. Fixed vent handles normal air in system.

NO STEAM LOSS—Stainless steel valve is water sealed, is not damaged by dirt or scale, cannot develop steam leaks.

CONDENSATE AND AIR REMOVED AT STEAM TEMPERATURE—No opening lag.

LONG LIFE—All working parts, including open float, are stainless steel. Bodies and caps designed for 250 psig operation. Open float cannot collapse.

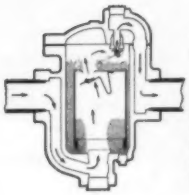
MINIMUM MAINTENANCE—Simple, proved design and high quality materials assure trouble-free service.

LOW COST—Mass production methods permit high quality at low cost.

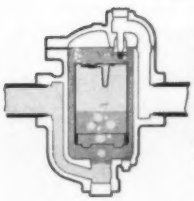
EASY INSTALLATION—Horizontal straight-through pipe connections, conventional sizes.

UNCONDITIONALLY GUARANTEED—All Armstrong Traps are guaranteed to satisfy the user or purchase price will be refunded.

HOW ARMSTRONG O. F. & T. TRAPS WORK:



When steam is turned on, it pushes air through the wide open thermic vent and trap discharge valve at full differential pressure between supply and return lines. Condensate formed by incoming steam goes right through.



As steam reaches open float, thermostatic vent closes. Float fills with steam and rises to close trap valve. Residual air and CO_2 escape through fixed vent at steam temperature.

BULLETIN NO. 775 BULLETIN NO. 801

Use the coupon at right to get these helpful bulletins: No. 775 describes O.F.&T. traps fully. No. 801 tells how to select traps for draining unit heaters including data on 30 makes of unit heaters.

ARMSTRONG MACHINE WORKS
9122 Maple St. • Three Rivers, Mich.

Armstrong Machine Works
9122 Maple St., Three Rivers, Mich.

Please send me: ☐ O.F.&T. Trap Bulletin No. 775; ☐ Unit Heater Bulletin No. 801.

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Company.....

Address.....

City.....Zone.....State.....

For more facts circle 641 on Reply Card

PROGRESS IN POWER TRANSMISSION CHAIN DESIGN

In 1953...

Whitney introduced the first oil-impregnated, sintered steel bushing roller chain — a major advance in chain design.

Not content with leading the field with the first sintered bushing chain, Whitney Engineers continued their exhaustive field research... carried on searching studies of the original sintered bushing chain in an effort to produce an even better chain with optimum performance characteristics. Their work, coupled with recent developments in sintering technology, resulted in the development of MSL Chain—a completely new concept in power transmission chain.

Today...

WHITNEY MSL® CHAIN... a product of continuing Whitney Research—is another giant step forward in chain technology because it advances and improves on the basic idea of oil-impregnated, sintered steel bushings in power transmission chain.

Only Whitney MSL Chain with oil-impregnated bushings assures complete built-in lubrication at all three critical lubrication areas:

1. **Pin**—Protective film of oil completely lubricates the live bearing area between pin and bushing, minimizing wear by reducing metal-to-metal contact.
2. **Plates**—Whitney oil-impregnated sintered steel bushings extend beyond surface of inside plates to act as lubricated thrust bearings, control clearance, and provide an oil cushion between plates, eliminating plate galling and seizing frequently caused by misalignment of sprockets.
3. **Sprocket Engagement**—MSL Chain does not require rollers, as the tough oil film on the bushing surface provides smooth sprocket engagement, cushions impact and reduces drive wear.

Inherent material characteristics of Whitney sintered steel bushings, plus bushing configuration that provides greater contact area between bushings and links, permit high interference fit, which pre-loads links and gives maximum fatigue resistance.

Whitney MSL Chain meets ASA Standards

It is made in Standard and Extended Pitch types, and is completely interchangeable with any similar pitch ASA Standard chain. For full details, write for MSL Catalog G1-59, or call your nearby Whitney Chain Distributor, who carries MSL Chain in stock for quick delivery.

***Maximum Service Life**

Whitney *Advanced Design is a Whitney Tradition*
CHAIN COMPANY

A Subsidiary of Foote Bros. Gear and Machine Corporation | 4583 S. WESTERN BOULEVARD CHICAGO 9, ILLINOIS

For more facts circle 642 on Reply Card

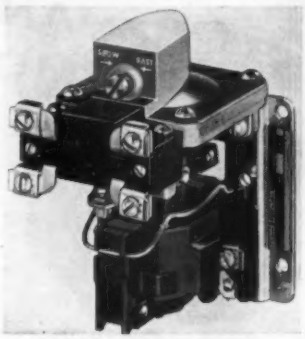
NEW PRODUCTS

(Begins on page 176)

3.6 lb per ft. The cable has been tested at 120-kv a-c for 5 min and 150-kv a-c for 15 min without any evident physical or electrical deterioration, company notes. National Electric Div., H. K. Porter Co., Inc.

72—PNEUMATIC TIMER has closed air system

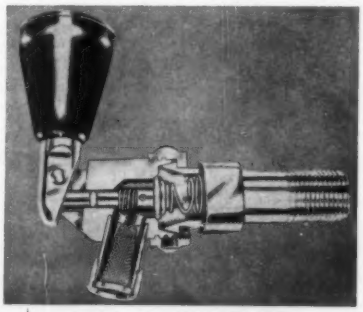
An internally ported air system is incorporated in this pneumatic timer to make it well suited for applications in dusty or dirty atmospheres. Since no



external air is used, foreign matter can't get into the system to interfere with timing accuracy, it is noted. The timer has a timing range adjustable from 0.2 sec to 1 min. It's available for a-c and d-c operation. Bulletin 9050-9 gives details. Square D Co.

73—DISPENSING VALVE now available in titanium

This ¾-in. dispensing, drain and sampling valve is now available not only in stainless steel, but also in titanium, for critical services in atomic energy, electronic and chemical industry ap-



plications. Offering titanium's outstanding resistance to many types of corrosive media, such as nitric acid in all concentrations, solutions of chlorine, chlorinated organic compounds and inorganic chloride solutions, the valve is announced as fea-

For more facts circle 643 on Reply Card →

RYKON *Grease*

passed this test at Corn Products Company

Situation: The springs in the grease chargers on expeller machines at Corn Products Company's Argo, Illinois, plant are under extra heavy tension. Due to this tension, oil formerly separated from the grease thickener in the grease cups. Bearings did not receive proper lubrication and the cups filled with grease thickener residue. The system needed cleaning every three months. Each time, large amounts of residue were found. Ten special-purpose greases were tried in an effort to solve the problem.

What was done: A Standard Oil lubrication specialist working with Corn Products' plant maintenance people recommended RYKON Grease #2 E.P. The system now needs cleaning only every six to nine months. Very little residue is found. Now RYKON Grease has become one of the important lubricating greases in use at Corn Products' Argo plant.

RYKON Grease is formulated with a unique non-soap organic thickener. The fibers of this thickener hold RYKON's fine quality base oil firmly in suspension. The grease resists water washing, high temperature and dirt contamination while providing superior lubrication to bearings of all types.

What you can do: Get more facts about RYKON Grease from the Standard Oil office nearest you anywhere in the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 80, Ill.**

You expect more from **STANDARD** *and you get it!*

Standard's Arnold Parus and chief lubrication foreman Henry Anderson take a look at expeller unit's grease system. Arnold Parus is well equipped through experience and training to work with plant men on lubrication problems. Arnold has a B.S. degree from Bradley University and three years' field experience in this kind of work. He has also completed Standard's Sales Engineering School.

Quick facts about **RYKON** *Grease*

- Heat stable. At sustained high temperatures, RYKON Grease remains soft and grease-like.
- Resistant to water washing.
- Mechanically stable. Minimum change in consistency in service.
- Resistant to oxidation. Thickener acts as inhibitor.
- Exceptional rust preventive properties.

OPEN-END V-BELTS and ALLIGATOR. FASTENERS

OPEN-END V-BELTING ASSURES YOU OF . . .

- Far less stretch than other "connected type" belting.
- Top drive performance — greater traction surface between drive belt and sheave.

Also, you can simplify the replacement of worn or damaged V-Belts . . . make up special size V-Belts quickly . . . and keep costly "downtime" at a minimum (no need to dismantle machinery).

ALLIGATOR V-BELT FASTENERS

Provide one strong joint . . . easy to install . . . terrific holding power . . . designed for minimum flexing of V-Belt traveling around sheave.

ORDER FROM YOUR DISTRIBUTOR OR WRITE TO . . .

Flexible
STEEL LACING COMPANY

4616 LEXINGTON ST. • CHICAGO 44, ILL.

For more facts circle 644 on Reply Card

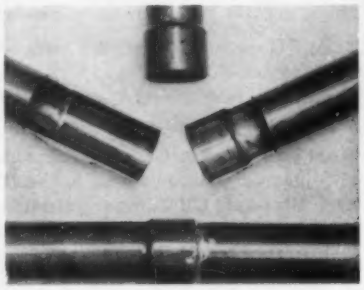
NEW PRODUCTS

(Begins on page 176)

turing fume-tight design with spring-loaded chemically-impervious Teflon seals designed to overcome seizure problems and assure instant shut-off or full flow. Eco Engineering Co.

74—TUBING provides one-piece piping system

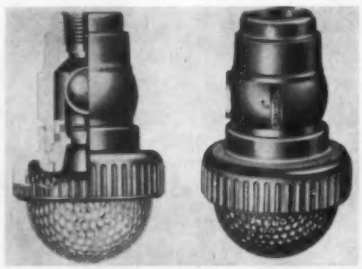
Smoothweld Tubing is designed for piping fluids where internal corrosion is not a factor. These tubes are soldered or silver brazed without the



need for separate couplings and thereby provide a "one-piece" system. One end of each length of tube is expanded. Plain ends are inserted into expanded sections where they are brazed or soldered. Both ID of expanded ends and OD of plain ends are held to very close tolerance to assure leakproof joint with a smooth internal surface. The Standard Tube Co.

75—FOOT VALVE has molded plastic construction

Designed to be used in sumps, tanks, etc., where fluid level must be reduced or fluid withdrawn, this foot-valve is claimed inert to corrosion and corrosive influences. The valve contains a



ball-type check valve to prevent back flow, and the suction end is protected against intake of debris with a large hemispherical plastic screen. It is furnished in Type I and II PVC as well as Kralastic, polypropylene and Penton, ½ through 2 in. Chemtrol.

(Continued on page 236)

DON'T GIVE UP!

—ON THAT TOUGH METAL-CUTTING PROBLEM!

USE

JUST CAN'T BE BEATEN . . .

If it's a "hard-to-figure-how", metal-cutting job, — there is a PORTER CUTTER that can handle it for you, with amazing speed, and lowest possible cost. In the versatile PORTER line there are 108 different hand-powered cutters, each one designed to do a particular job, or jobs — to cut some type or size or shape of metal fast and cheap, including BOLTS, RODS, SCREWS, RIVETS, WIRE, CHAIN, SOFT, MEDIUM AND HARD METALS, STEEL STRAPPING, and many others. These rugged cutters exert up to 20,000 pounds cutting pressure — make hard work easy, cut labor costs as much as 97%! Want profitable proof? Write for the PORTER catalog.

Illustrated above — is the famous PORTER CENTER-CUT CUTTER. The leading all-round cutter for industrial production. 8 sizes — up to ¾" capacity.

for "PRODUCTION" CUTTING

The PORTER WORK-STATION CUTTER — in 3 sizes — can increase the output of one man up to 300% in continuous volume cutting, up to ½" capacity.

for THOSE RUGGED JOBS!

PORTER HEAVY DUTY CUTTER

Cuts almost anything in metal — up to ¾" diameter — thanks to its heat-treated, heavy-forged straps, and hard-tempered, center-cut jaws. Available in 3 sizes.

WRITE FOR CATALOG

It should show you the way to the solution of your metal-cutting problem.

Contact your Industrial Distributor for Service

H. K. PORTER, Inc.
Somerville 43, Mass.

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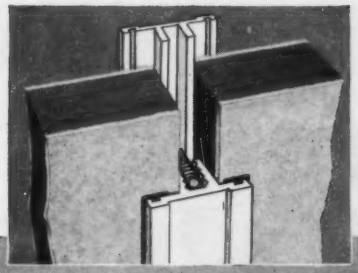

The H&B System, used on this job, has been engineered to combine economy of materials and minimum erection costs.

New Du Bois building, East Rutherford, N. J. The Du Bois Co., Inc., are manufacturers and distributors of institutional, industrial and commercial cleaning and processing compounds.

Asbestone Panel Curtain Walls give Du Bois plant insulation, plus an interior and exterior wall...all in one!

The architect who designed this modern building, specified Gold Bond ASBESTONE Panels because he was delighted with the results he had achieved with ASBESTONE Panels on previous jobs. They go up fast and provide 1-2-3 construction in one application: an inside wall; an outside wall *and* insulation.

The versatility of the ASBESTONE Panels System give architects and engineers complete latitude in design. The materials used are standard components and can be adapted to fill most curtain wall requirements.

A 2-inch thick ASBESTONE Panel has a U-Value of up to .17. Three other thicknesses are available for lower insulation requirements.

The Asbestos-Cement facing on both sides of ASBESTONE Panels furnish weather-proof, maintenance-free exterior walls, plus attractive interior walls which never require additional finishing...and they are non-combustible.

To find out about all the other advantages and uses of ASBESTONE Panels, ask your Gold Bond® Representative or write Dept. PE-119 for our new ASBESTONE Panels Manual A. I. A. File No. 19-D.

NATIONAL GYPSUM COMPANY, BUFFALO 13, NEW YORK

Gold Bond BUILDING PRODUCTS ...a step ahead of tomorrow

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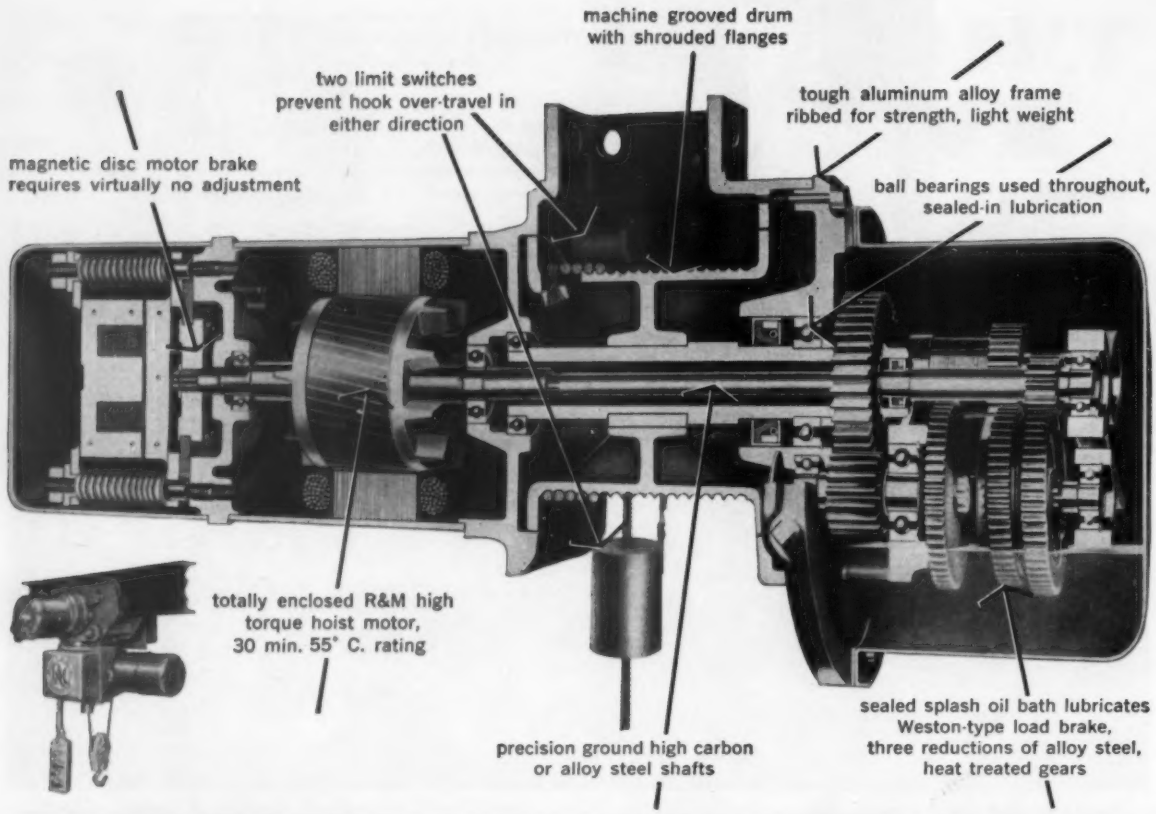

all new! hoist you'd build

R&M Type J hoists, now redesigned, give you the same quality engineering features *throughout* the line that have made Robbins & Myers hoists tops in industrial value. In the low price field the new Type J hoist features a trouble-free disc type motor brake for driftless spotting, and a sturdy Weston-type load brake. Upper and lower jam-proof limit switches, three gear reductions, and liberal use of ball bearings insure reliability. Robbins & Myers hoist motor has the highest time rating found in any low cost hoist—30 min., 55° C. This is the way you'd build it; the price is right, too.

Capacities: ¼, ½, 1, and 2 tons. Lug mounting and push-button control are standard. Push, hand geared, and motor driven trolleys available.

Robbins & Myers, Inc., Hoist & Crane Division, Springfield, O.

take it up with

ROBBINS & MYERS

hoists cranes

Request Bulletin 905 today

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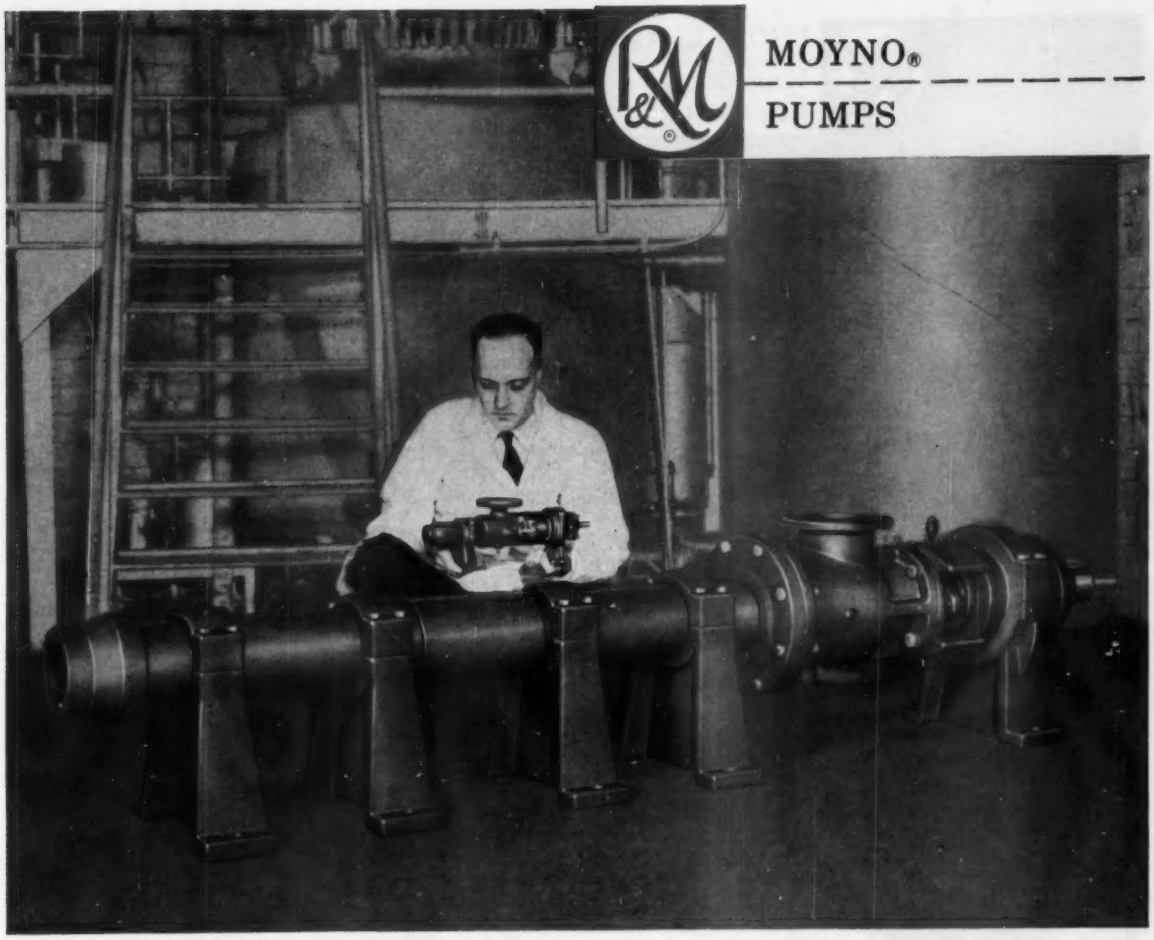
MOYNO®
PUMPS



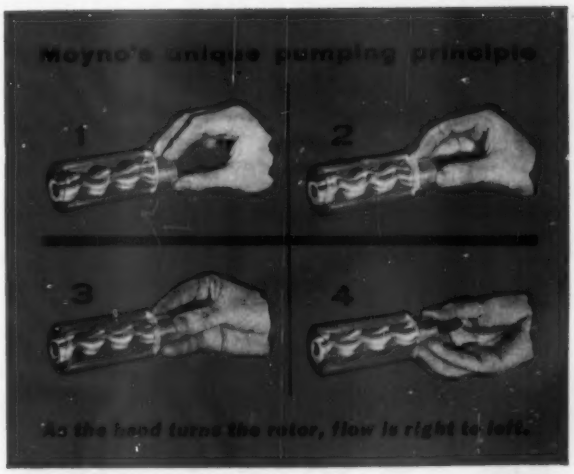
MOYNO® PUMPS

capacities: from 1/100 to 500 gpm
pressures: up to 1000 psi

MOYNO pumps are available in nine sizes with capacities ranging from minimum metering flow to 500 gpm and pressures from zero to 1000 psi. Positive displacement delivers uniform discharge without pulsation, agitation or turbulence. Solutions ranging from thin watery slurry to extremely viscous paste, corrosives, abrasives and even solids in suspension are economically handled without excessive pump wear.

MOYNO's unique *"progressing cavity"* principle with only one moving part and special resistant internal parts slashes pump maintenance costs on problem materials that often ruin other pumps. Almost any substance that can be forced through a pipe can be pumped by a MOYNO.

To learn how a MOYNO can cut your pumping costs, write today for Bulletin 30-PE



ROBBINS & MYERS, INC.
motors, household fans, Propellair industrial fans, hoists, Moyno industrial pumps
SPRINGFIELD, OHIO · BRANTFORD, ONTARIO

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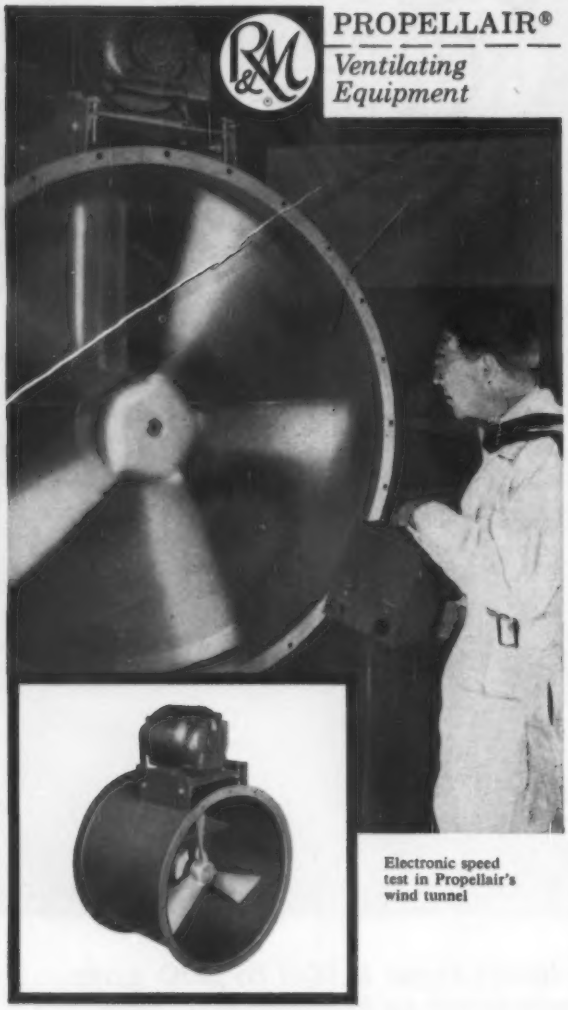


Electronic speed test in Propellair's wind tunnel

FOR RUGGED DUTY...
NEW design axial fans
in sizes up to 60 inches!

Move corrosive or explosive fumes, extreme heat or high humidity with new PROPELLAIR Type BT belt driven axial fans. They feature heavy 10 and 12-gage drums . . . isolated, air-cooled, protected bearings and belts . . . airfoil propellers cast of hi-strength aluminum-magnesium alloy . . . Robbins & Myers *"All-Weather"* motors for a single nameplate guarantee on the complete unit.

Hi-pressure, big hub propellers are available for those tough applications developing high resistance.

Send today for complete information on this modern, efficient fan. Ask for Bulletin 620—PE

PROPELLAIR®
Div. of Robbins & Myers, Inc., *Springfield, Ohio*

DIRECT CONNECTED | SKY-BLAST® ROOF VENTILATOR | TUBEAXIAL and VANEAXIAL | EXTENDED SHAFT | BELT DRIVEN | MAN COOLERS

MOVING AIR IS OUR BUSINESS®

For more facts circle 649 on Reply Card

NEW PRODUCTS

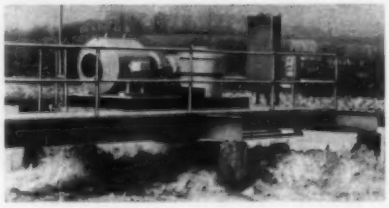
(Begins on page 176)

76—FLOW REGULATOR without moving parts

The Series 300 Micro Adjustable Orifice is essentially an adjustable needle valve encased in a sight glass. It is designed to be used instead of steam traps to drain heating and processing units operating continually at pressures up to 60 psi. The orifice works without moving parts, company says, providing continuous circulation of condensate with virtually no maintenance. Condensate is drained immediately to allow each steam-operated unit to perform at peak efficiency. Flow of condensate may be minutely regulated by hand key. Sight glass and optional thermometer permit constant visual check. Orifice is made for pipe sizes from ½ to 1 in. Stickle Steam Specialties Co.

77—MECHANICAL AERATOR is low-cost unit

The Vortair is announced as a low-cost aerator for introducing atmospheric oxygen into an aeration or lagoon at any desired rate. Essentially a turbine type mechanical aerator, the Vortair rotor is so shaped and mounted, and



rotated at such speed, as to draw large quantities of air from atmosphere into the liquid. It also keeps liquid mixed and distributes oxygen. According to company, power consumption is conservative. Infilco Inc.

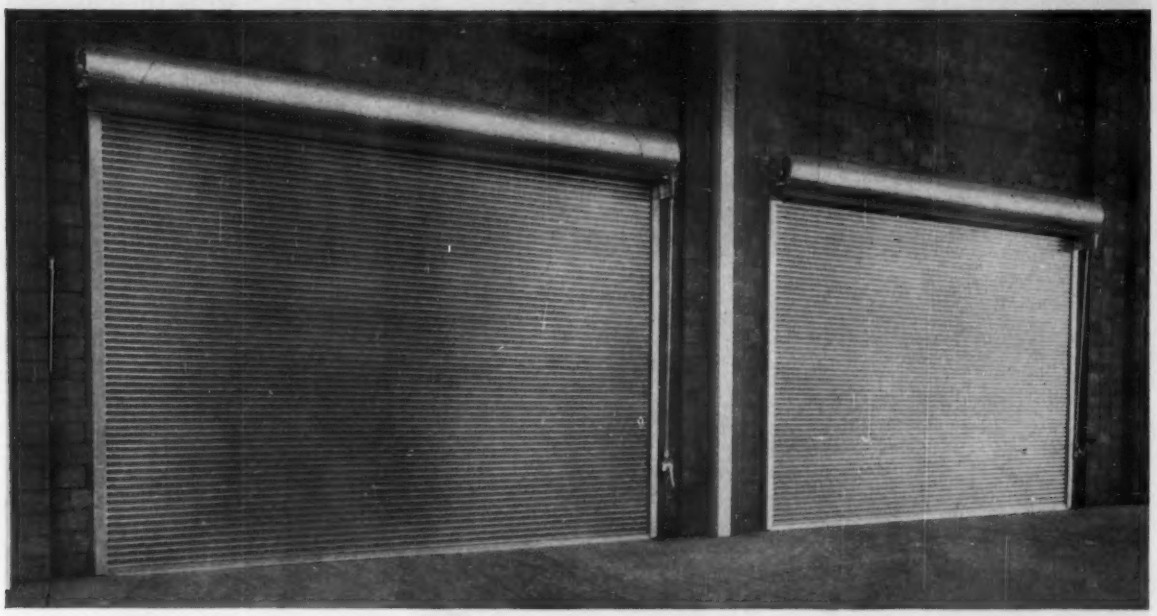
78—PENDENT SWITCH is light, compact, six button model

The Joy Safe Switch is now offered in a six-button model for pendent applications. It is announced as completely contained within a two-piece Hycar enclosure featuring waterproof, non-corrosive and lightweight construction.

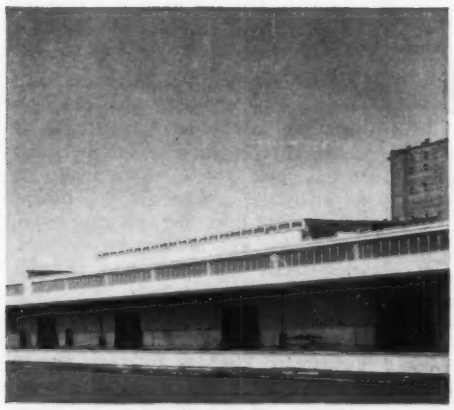
Each button is an integral part of the housing which encloses—by continuous design—each of the six snap-action switches. It is claimed impossible for water, dust, grime, or weather to reach them and cause breakdown. Buttons are generous in design, with a choice of lettered aluminum legends, and can be activated even with a gloved hand, company points out. A ring-shroud protects each button from side-direction accidental action.

The Hycar housing weighs but a fraction of a conventional cast iron unit, and is about one-third the size. Applications include hoist and crane operation, installation over heavy machinery, other areas where light, positive-acting weathertight, pendent switch stations are desirable. Electrical Products Div., Joy Mfg. Co.

ROLLING STEEL DOORS



64 Mahon Rolling Steel Doors Add to Efficiency and Security of New Seaway Wharf Facilities at Duluth!



Above are two of the eight Mahon Automatic Rolling Steel Fire Doors installed in the Fire Walls of the Transit Shed and Warehouse in the New Seaway Wharf Facilities at Duluth, Minnesota. Lower illustration is partial view of Transit Shed. Engineers: Pfeifer & Shultz. Gen. Contrs. Johnson-Drake & Piper.

In the new Seaway Wharf Facilities at Duluth, Minnesota, which include a Transit Shed and Warehouse, there are 56 Mahon Standard Rolling Steel Doors 13′-9″ x 12′-0″, and 8 Automatic Rolling Steel Fire Doors 20′-0″ x 14′-0″. Due to the oversize requirements of the Automatic Fire Doors, they were constructed in strict accordance with Underwriters' Specifications and an Underwriters' Certificate was issued to the Seaway Port Authority of Duluth in lieu of the regular Underwriters' Label.

The vertical roll-up action of Mahon Rolling Steel Doors requires no usable space either inside or outside the opening—and it eliminates overhead tracks which restrict headroom and interfere with crane handling. Their all-metal construction gives you the permanence of Bonderite-protected galvanized steel . . . maintenance is minimal; and, in steel, you get maximum protection against intrusion and fire.

No other type of door provides all of these important features which are so essential for functional efficiency in busy doorways today. When you are ready to buy any kind of rolling steel door, check specifications carefully . . . you'll find, through comparison, that Mahon Rolling Steel Doors are built better to give you better service over a longer period of time. See Sweet's Files, or write for Mahon Catalogue G-60.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York, Chicago, Los Angeles and San Francisco
Sales Representatives in All Other Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Automatic Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters; Underwriters' Rated Metalclad Fire Walls, Insulated Metal Curtain Walls, Electrified M-Floors, Acoustical and Troffer Forms, Acoustical Metal Ceilings, Steel Roof Decks, and Long Span M-Decks.

ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

MAHON

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1 Gasoline burning for one minute is doused by sprinkler for one minute

2 Two minutes after ignition, foam is discharged through nozzles at side of pan

3 60 seconds later the foam-blanket is completed and fire extinguished

4 Sprinkler water turned off after 4 minutes, leaving a foam blanket through which gasoline vapors could not be re-ignited

A Chemical Foam That Stands Up Under Sprinklers

Now . . . the improved American LaFrance ST unit produces a chemical foam of greater stability that provides a cohesive fire-smothering blanket, regardless of sprinkler water applied before, during or after the foam is discharged.

Incorporating a new protein-base stabilizer, the Foamite Firefoam produced by this new ST unit has an increased expansion ratio up to 35 or 40 per cent . . . considerably greater than ever before. Higher expansion that means a correspondingly higher application rate, thus assuring faster, more positive fire control for industrial hazards, including dip tanks, drain boards, quench tanks and numerous other risks. Water resistance of the new foam banishes the need for plugging sprinkler heads or building water-deflection canopies over high-hazard areas.

Foamite ST units of 10 and 40 gallon capacity are available for use in systems up to 160 gallons capacity that produce uniformly good foam quality throughout discharge.

World's Largest Maker of a Complete Line of Fire-Control Equipment

Write for catalogue 571, showing equipment to fit your every need. Or ask for a factory salesman to call. He will survey your plant for fire hazards. No cost. No obligation.

AMERICAN LAFRANCE

DIVISION OF STERLING PRECISION CORPORATION
ELMIRA, N. Y., U. S. A.
In Canada, LaFrance Fire Engine and Foamite, Ltd., Toronto, Ont.

For more facts circle 651 on Reply Card

NEW BOOKS

for the plant engineer

Asbestos Applications

ASBESTOS—ITS INDUSTRIAL APPLICATIONS by D. V. Rosato. Size 7⅛ by 5¼ in. approx; 214 pp including index; illustrated; cloth bound. Published by Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. Price $5.75.

A COMMONLY used product extracted from the earth's crust is the subject under the spotlight in this interesting and informative book. In it the author brings out the areas where this mineral is found and mentions types. Fabrication into various products is explained briefly and many applications are listed.

These are topics of some of the twelve chapters: asbestos-cement products, electrical insulation, asbestos textiles, plastics, and asbestos packings and gaskets.

At the back of the book there is an extensive list of reference material bearing on the subject.

Process Analyzers

CONTINUOUS ANALYSIS OF CHEMICAL PROCESS SYSTEMS by Sidney Siggia. Size 9¼ by 6¼ in. approx; 381 pp including index; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $8.50.

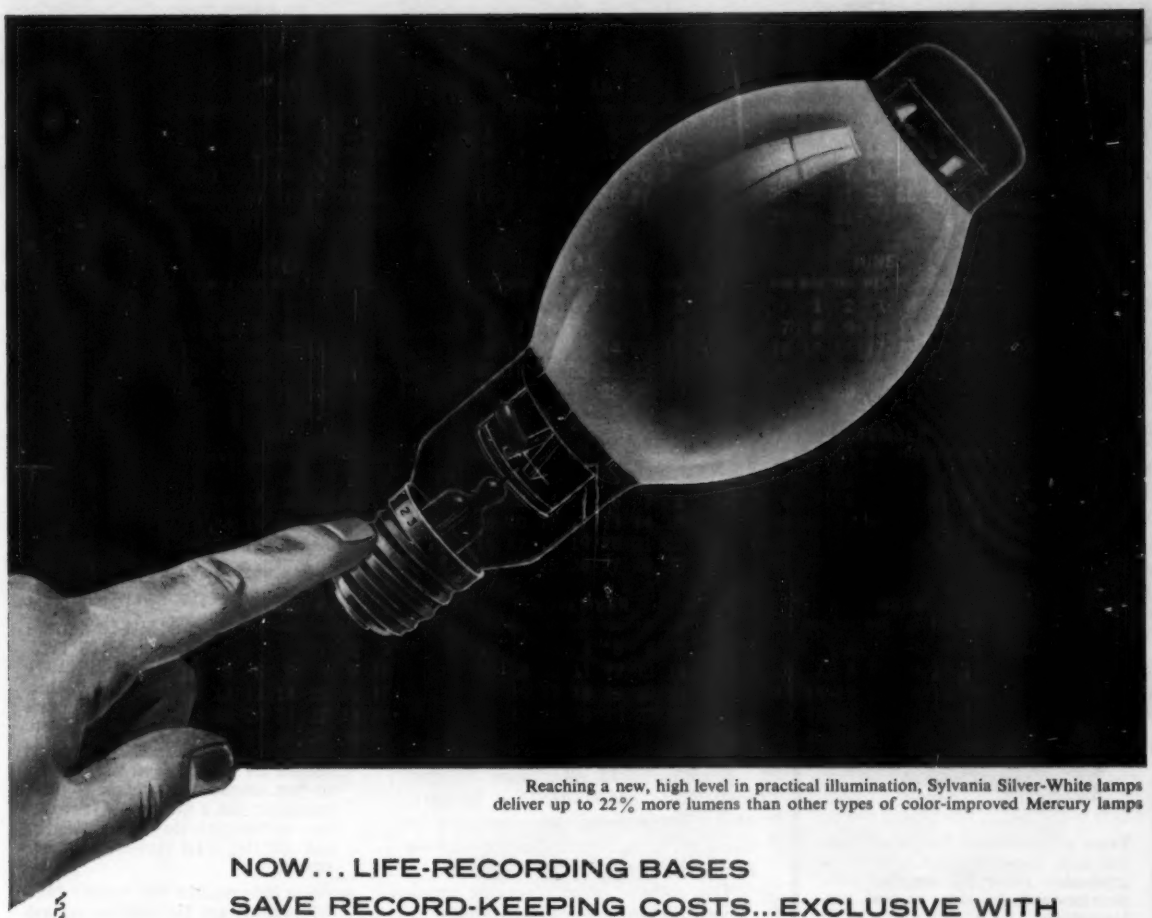
DESCRIPTIONS, specifications, and sample applications of analytical devices for continuous monitoring of chemical process systems are presented in this book. The author, manager of an analytical and service department of chemical firm, has collected information for this book from journals, commercial literature, and through personal communications.

Some of the chapter topics under which the various devices are discussed are titled as follows: density and specific gravity; viscosity measurement; pH and potentiometric measurements; mass spectrometry; vapor chromatography; and gas analysis using sonic velocity.

On Metallizing

METALLIZING HANDBOOK. Size 8¾ by 6¼ in.; 320 pp; illustrated; cloth bound. Published by Metallizing Engineering Co., Inc., 1101 Prospect Avenue, Westbury, L. I., New York. Price $5.00.

SPRAYING metal to repair and salvage items for further use calls for a lot of considerations. This book con-



Reaching a new, high level in practical illumination, Sylvania Silver-White lamps deliver up to 22% more lumens than other types of color-improved Mercury lamps

NOW... LIFE-RECORDING BASES SAVE RECORD-KEEPING COSTS...EXCLUSIVE WITH

Sylvania *Ruggedized* Mercury Lamps

A scratch of a simple tool, such as a screwdriver, easily records the month and year when a Sylvania "Ruggedized" Mercury Lamp is installed. This simple built-in record-keeper eliminates expensive records and time... is an instant aid in figuring installation costs accurately.

The recording base, however, is but only one reason to consider Sylvania "Ruggedized" Mercury Lamps for all of your highway, street lighting needs as well as high-bay industrial installations.

For example, Sylvania "Ruggedized" Mercury Lamps right now provide users across the country with all these important, *exclusive*, cost-reducing benefits:

Increased lumen output. Recent phosphor improvements boost the Silver-White Phosphor-Coated SH-1 lamp from 23,000 lumens in 400 watts to 25,000 lumens—the most efficient commercial mercury lamp (62.5 lumens per watt) available today.

9000 hours average usable life. You get the equivalent of two years' street lighting service. Built for long life and high lumen maintenance, these lamps have increased from 7000 to 9000 usable hours.

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Guaranteed performance. Free exchange on any lamps which burn out during the first 1000 hours.

A complete line of Ruggedized Lamps covers a range of 400-, 425-, 700- and 1000-watt sizes . . . Silver-White (*Kolor-Keyed*), Clear and Color-Improved types . . . 25,000 to 62,000 lumens output.

Let Sylvania's staff of lighting engineers help evaluate your present and future lighting requirements, without obligation. For information or literature, call your Sylvania representative or write:

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Years of experience are packed into this new 6-article series — each an invaluable guide for keeping commutators and slip rings at peak performance.

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NEW BOOKS

tains a comprehensive treatment of the various details that belong to the metal spraying field. It deals with both the wire process and powder process and also includes coverage of applying corrosion resistant coatings.

Among the topics of discussion are the following: preheating and cooling; sealing sprayed coatings; surface preparation; selection of metal; fully automatic production metallizing; engineering production installations; crankshafts; ventilation for blasting and metallizing; and importance of safety measures.

The book includes tables which give the weights and sizes of different types of wire and spraying speed conversions from feet per minute to pounds per hour.

Radioisotopes

RADIOISOTOPES FOR INDUSTRY by R. S. Rochlin and W. W. Schultz. Size 7⅝ by 5½ in.; 190 pp including index; illustrated; cloth bound. Published by Reinhold Publishing Corp., 430 Park Avenue, New York 22, N. Y. Price $4.75.

RADIOISOTOPES offer some helpful, cost-cutting possibilities for industry. Many applications are discussed in this interesting and informative book dealing with radioactive materials.

The authors present specific applications in field pertaining to: plastics, petroleum, paper, paint, steel, food, autos, chemicals, textiles, and others.

Topics of some of the twelve chapters in the book are as follows: gaging without contact; radiography and autoradiography; wear measurement; finding leaks with radioisotopes; equipment, facilities and training; protection from radiation hazards; and present trends and future possibilities.

The book includes a table on useful radioactive isotopes and one on activation by thermal neutrons. There is also a bibliography of reference materials which can be helpful to those interested in future study of radioisotopes.

Slide Rule Operations

THE MODERN SLIDE RULE by Stefan Rudolf. Size 10⅞ by 8¾ in.; 70 pp; illustrated; paper bound. Published by the Williams-Frederick Press, 391 East 149th Street, New York 55, N. Y. Price $5.00.

THE METHOD of handling slide rule computations demonstrated in this book can automatically help one set the decimal point in the result after the manipulations have been com-

New Way to Stop Faucet Leaks!

★ 9-in-10 washers are fastened with TOO LONG or SHORT SCREWS thus loosen and destroy themselves. Leaks quickly follow!

34 YEARS OF RESEARCH REVEALS NEW SOLUTION

★ New, patented 'Sexauer' SELF-LOCK screws have imbedded expanding NYLON PLUG. They lock at required depth AUTOMATICALLY, hold washers firmly! Made of MONEL, they are rustproof, non-corroding. Heads can't twist off. Screw slots can't distort.

★ NEW, improved 'Sexauer' EASY-TITE faucet washers are made of super-tough, pliable du Pont compound (not rubber or fibre). Reinforced, like a tire, with a vulcanized layer of Fiberglas, they resist distortion and splitting from shut-off grind and squeeze.

★ Faucet leaks repaired with 'Sexauer' EASY-TITE washers and SELF-LOCK screws outlast ordinary repairs "6-to-1"!

HIDDEN COSTS OF FAUCET LEAKS!

Hackensack, N.J. Water Co. and American Gas Association figures prove stopping just ONE PIN-HOLE SIZE (1/32") LEAK saves you 8,000 gal. water quarterly. A HOT WATER FAUCET LEAK repair saves you over $7.58 QUARTERLY in fuel and water bills. Fewer leaks also produce important savings on MATERIALS, LABOR and COSTLY FIXTURE REPLACEMENTS!

A 'Sexauer' Technician will make available our NEW Catalog, Edition "J", listing our entire line of over 3,000 TRIPLE-WEAR plumbing repair parts and tools. He will survey your fixtures, determine the repair parts needed and establish an efficient stock arrangement and control to prevent costly overstocking or shortages. You get this service without obligation. *Act now!*

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SEXAUER

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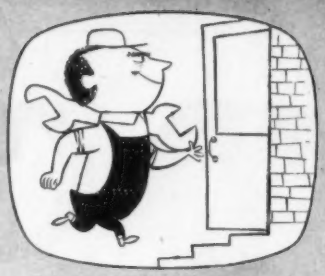
4-Way® Safety Plate Presents

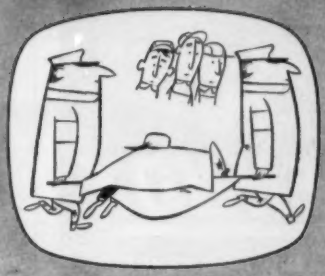
A GRIPPING TALE OF LIFE ON SKID ROW

THE BIG SLIP!

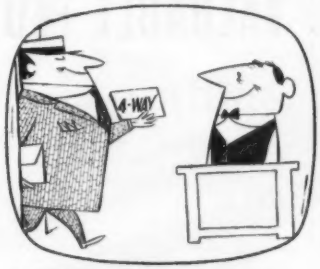


Enter our star—Benny Bandsaw. Great guy on the production line. Mr. America to his wife and kids. Every day Benny and millions just like him, go to work on Skid Row.

Watch it, Benny—look out! Wow! Too bad. On Skid Row, what *on the surface* appears to be a safe place to work, may turn out to be a surprise for Benny and his buddies.



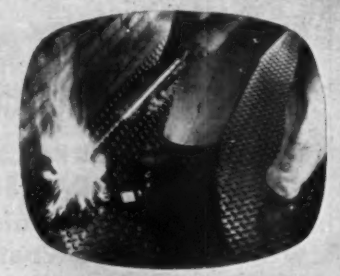
And thus, another Skid Row tragedy. Our hero gets the slip and the result is *lost* time...*lost* production...*lost* safety records . . . and *lost* money.



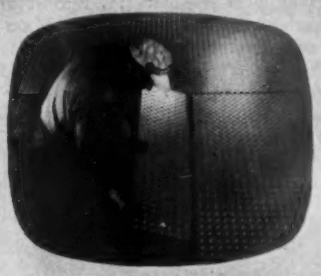
But...help is at hand. Enter 4-Way salesman...J. W. Goodheart...genial representative for versatile, slip-resistant 4-WAY Safety Plate!

Solution? Yes, Sir! Industrial plants, stores, offices, schools, hospitals, all over the USA, use 4-WAY . . . find it SAFE, STRONG, EASY TO CLEAN, ATTRACTIVE!

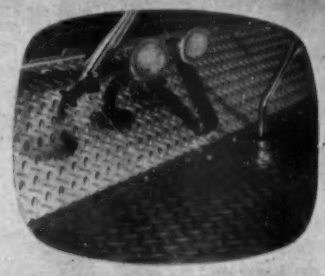
What's more, 4-WAY can be flame cut, sheared, sawed, drilled, punched, welded, formed . . . it is simple and EASY TO FABRICATE!



FIRESAFE, too! 4-WAY is an added safeguard for your people, your plant, your equipment and stock . . . and my how those insurance men appreciate it.



When it comes to installation and maintenance, no special tools or skill is required. Inland 4-WAY Safety Plate is one of the most ECONOMICAL materials you can use!



And don't overlook the advantages of super-strong, mighty-attractive, 4-WAY on the products you make. It can add an important merchandising feature that will help boost sales.

AMERICAN STEEL WAREHOUSE ASS'N.

INLAND

4-WAY® SAFETY PLATE

Available at your Steel Service Center or from Inland in a wide variety of patterns and sizes.

INLAND STEEL COMPANY

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LENNOX®

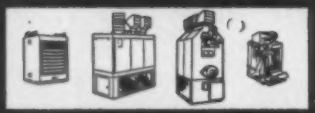
GAS...OIL...OR NEW TYPE

Dual Fuel

POWER BURNERS

Combination burners are available for the "OG-4," and are interchangeable with single fuel burners. All burners are of the same general construction; switching from dual fuel to a single fuel burner involves changing only one or two minor parts. On all burners the combustion air is pre-heated. "Push button" changeover from one fuel to another and electric gas ignition give added ease of operation and safety to the combination burners. Write today for the full story.

LENNOX "Task Matched" Equipment to control and condition air for industry



64,000 to 2,000,000 Btuh Units

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Please send me—without obligation—complete specifications and engineering data on Lennox "OG" Series Industrial Heaters

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NEW BOOKS

pleted. Numerical keys are assigned to the factors involved and these are used to indicate the decimal location. The system devised by the author is patent pending.

Instructions on the uses of the method start in a discussion on multiplication and then the method is applied to division, combined multiplication and division and to other useful operations.

In addition, the book contains information, not involving the keyed method, on the handling of logarithms, use of log scales, trigonometric equations and quadratic equation solution with the aid of the slide rule. Many exercises and corresponding answers are given in the appendix.

Valves

REGULATORS AND RELIEF VALVES. Size 8¼ by 5½ in.; 201 pp including index; illustrated; paper bound. Published by Instruments Publishing Company, 845 Ridge Ave., Pittsburgh 17, Pa. Price $2.00.

THE INNER-WORKINGS, sample hookups, and some applications of control equipment are brought into focus in this informative book. Plant engineers will find in the publication brief familiarizing treatments of a variety of designs of valves in the categories mentioned in the title.

Among the many topics of discussion in this book are the following: regulators with integral pilots; vacuum regulators; combined pressure-temperature control; expansion type thermal level regulators; liquid level measurement; safety-relief valves; sizing of safety-relief valves for variable back pressure; temperature-actuated valves; vacuum breakers and vacuum relief valves.

"Oh, just killing time. What are you doing?"

STOP!

COSTLY LEAKS OF VALUABLE FLUIDS WITH

DURA SEAL

THE ENGINEERED MECHANICAL SEAL

Savings in product alone will repay the cost of Dura Seal installation

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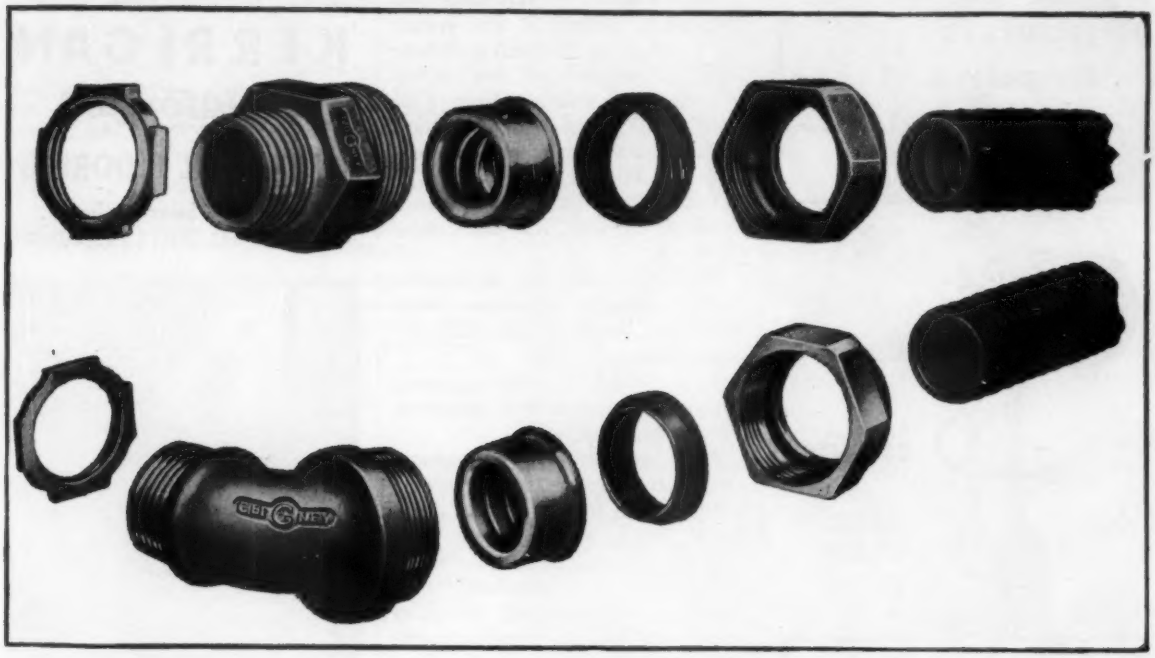
GEDNEY— every time!



THESE ARE THE NEWEST, most efficient liquid-tite connectors available today for use with Sealtite* and equivalent liquid-tite conduits. Designed to give wiring installations absolutely dependable protection in these popular oil- and water-tight flexible raceways, Gedney Liquid-Tite Connectors are built for lifetime service.

As shown from left to right in the exploded views above, Gedney Liquid-Tite Connectors consist of:

1. **Locknut—nut stock steel—cadmium-plated**
2. **Main Fitting—straight, 90° angle, or 45° angle—malleable iron—cadmium-plated**
3. **Grounding Bushing—one piece—threaded to engage conduit spiral**
4. **Molded Vinylite sealing ring—pliable—ever-lasting**
5. **Gland Nut—malleable iron—cadmium-plated**

Standard sizes range from ⅛" to 2" straight, 45° and 90° . . . order Gedney Liquid-Tite Connectors for top safety and longest life.

* *Sealtite is the trade name of American Metal Hose Branch of the American Brass Company*

GEDNEY FITTINGS FIT!

GEDNEY
ELECTRIC COMPANY

RKO BLDG., RADIO CITY, NEW YORK 20
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Lodestar®
electric hoist

now...
important
new models

GREATER SELECTION... from a complete range of capacities and speeds ...1/8 to 2 tons and 8 to 60 fpm.

Here's your opportunity to slash lifting and handling costs. Put these new Lodestars to work where their increased speeds and capacity match your maximum requirements.

LODESTAR FEATURES INCLUDE:

- Safe, Heavy Duty Performance
- Lowest Headroom
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- Fully Enclosed Components
- Self-Adjusting Magnetic Brake
- Ultra-Modern Electric Braking
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Request catalog and name of local stocking distributor.

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CM HOISTS

For more facts circle 659 on Reply Card

More Maintenance Per Dollar

(Continued from page 130)

required items. Figure 4 shows the forms produced by a planner, on an electrical installation job. On completion of the project planning, costs are presented together with all planning data for project approval.

The scheduling technique and procedures utilized in this system are based on the standard man-hour workload concept and are applied to obtain maximum utilization of manpower, material and facilities. Basically, a scheduler must accomplish the following:

1. Determine the total manpower required, by skill, for job accomplishment.
2. Match manpower required to that available to determine when work can be most effectively accomplished.
3. Workload the shops to assure the greatest productivity consistent with time requirements.
4. Advise all levels of management of the relationship of available manpower to total workload at all times.

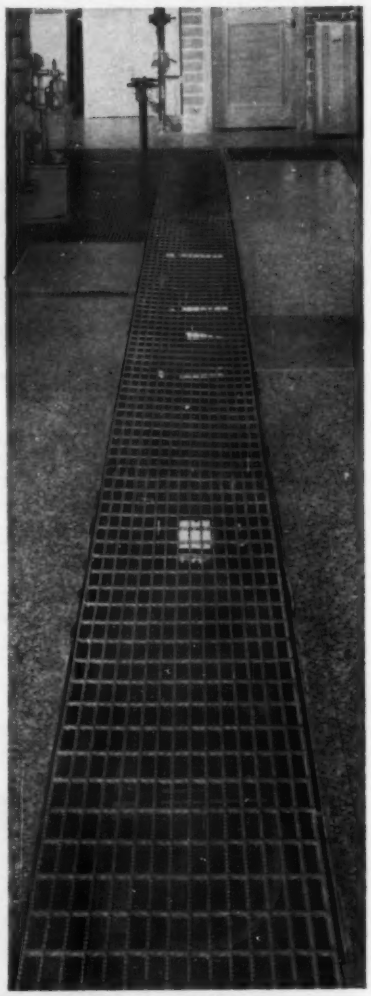
It is interesting to review, "What results does good scheduling produce?" Good scheduling results in the accomplishment of work consistent with an established priority of accomplishment. It assures maximum supportability, insures interchangeability and maximum turnover of the material inventory, yet maintains minimum dollar investment. Good scheduling results in increased efficiency of the work forces by having the right men and right materials at the job at the right time. It minimizes the administrative costs by making costs and materials withdrawal transactions properly, on time, without additional priority action, debits, and credits that often result from poor initial planning and scheduling. Good scheduling leaves the shop supervisor a greater portion of his workday to manage his people. **End of part I.**

Part II. Applying the System

The second part of this description of the maintenance operation at Kelly Air Force Base will appear next month. In it, we will show how the management system is applied, and how it relates to the actual work accomplished by the Engineering shops.

PLANT
SAFETY
HERE WITH
KERRIGAN
Weldforged
TRADEMARK
OPEN STEEL FLOORING

Note serrated bearing bars . . .
AN ADDITIONAL SAFETY PRECAUTION!



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KERRIGAN IRON WORKS CO.
Nashville 2, Tennessee

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FROM GENERAL ELECTRIC . . .

NEW *Polyseal** *Insulation Systems*

• Sealed Against Contaminants

• Help Cut Motor Costs

MOTOR SAVINGS OF UP TO 50% are now possible by applying General Electric motors with Polyseal insulation systems in many outdoor, high moisture, dust and other severe atmospheres which formerly required additional enclosure protection.

POLYSEAL INSULATED COILS are vulcanized and cured—to bond and seal the supported silicone rubber tapes. Every coil must pass an underwater hi-pot test to make sure it is positively sealed against moisture and other contaminants.

THIS NEW GENERAL ELECTRIC INSULATION system also provides greater thermal, voltage and environmental endurance than conventional systems. For added mechanical strength, glass fabric supporting materials are imbedded in each layer of tape. Each coil is wrapped with many layers of this tape. Coils are securely held in the motor by G.E. patented tying and bracing techniques.

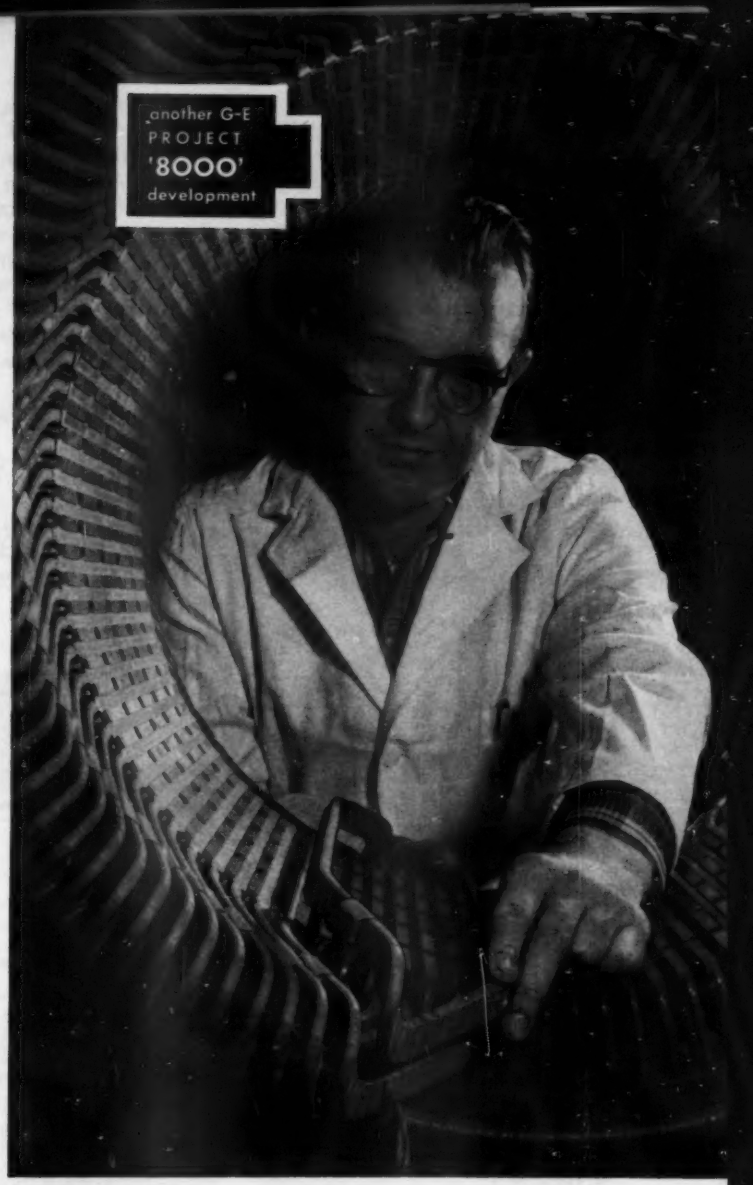
ALSO AVAILABLE IN G-E RANDOM-WOUND MOTORS, the Polyseal system is used for stator and end turns, sealing windings with a waterproof, inert covering.

FOR MORE INFORMATION on Polyseal Insulation Systems, call your nearby G-E Apparatus Sales Office, or write for bulletin GEA-6889, Section 884-4, General Electric Co., Schenectady, N. Y.

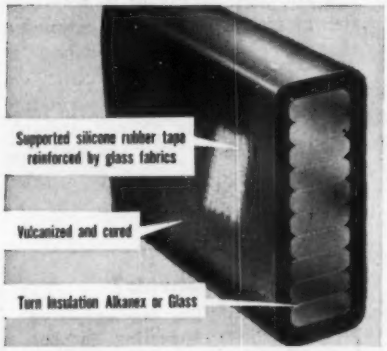
PROJECT '8000' . . . a major General Electric program of research, redesign, advanced manufacturing and improved customer service on A-c motors 150 to 6000-hp.

**Trademark of General Electric Co.*

GENERAL ELECTRIC

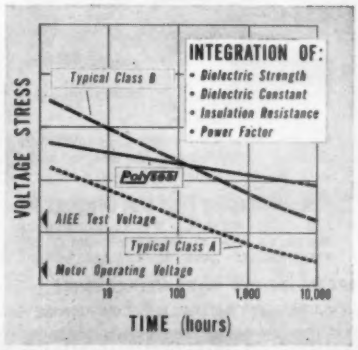


FULLY SUPPORTED



Using specially developed G.E. supported silicone rubber tape, Polyseal is the first silicone rubber insulation system on the market that is fully supported against mechanical breakdown.

LONG LIFE



Tested over long periods of time with voltage applied, General Electric's new Polyseal silicone rubber insulation systems retain a much higher dielectric strength than other commonly-used insulations.

COMPLETELY SEALED

Positive lead seal is provided by special silicone rubber compound which vulcanizes the lead tubing to the silicone rubber wall of the coil. This effectively seals the coil against contaminants.

For more facts circle 661 on Reply Card

Maintenance on Cards

(Continued from page 103)

able from a list posted in the shop, and (d) the time the job is finished. **For planned maintenance work**—(a) The number of the department, (b) the machine number, (c) the planned maintenance number—obtainable from a list in the shop or from the job order, if any—(d) the time the job was finished, and (e) job order number (if any).

The tabulating run shows: (a) the capital or planned number, (b) the machine number, (c) hours worked, (d) value in dollars, (e) clock number of the mechanic, and (f) the day the work was done.

By using this system the following advantages are obtained:

A timely accurate recording of labor costs is available. This is invaluable in detecting when an overrun is likely to occur.

An excellent visual record is available of labor costs to maintain each individual piece of machinery. The task of picking out "weak links" is simplified. This has a twofold advantage.

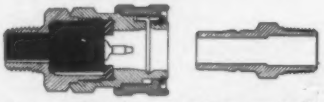
(1) Equipment requiring re-design is readily pin-pointed.

(2) An accurate story of costs can be obtained in order to request expenditures to replace faulty equipment.

After two years of operation, the people at Moore feel that the system is providing valuable, timely information and is well worth the effort and work invested in the system, both in the original set-up and its operation. **End**

- Tough...compact...smaller...lighter.
- Handles more air—with minimum pressure drop.
- Quick connection and disconnection.
- Instant automatic flow or shut-off.
- Handles any job in your shop using ¾" to ⅛" connections—from the air line to the air tool.
- Locking ring provides positive lock ...tight fit. Equipped with automatic sleeve lock.
- All Series 2-RL Sockets and Plugs are interchangeable—likewise all Series 3-RL Sockets and Plugs. Eliminates all need for various size couplings in hook-up—makes it easy to keep stock of parts in balance—holds inventories to a minimum.

with the HANSEN Series RL QUICK-CONNECTIVE Ring-Lock Coupling



Socket, when disconnected, automatically shuts off air by leak-proof seal of metal valve against rubber valve seat.

Write for the Hansen Catalog... a ready reference when you want information on couplings in a hurry.

Quick-Connective Fluid Line Couplings for AIR • OIL • GREASE • HYDRAULIC FLUIDS WATER • VACUUM • STEAM • OXYGEN • ACETYLENE REFRIGERANTS • GASOLINE • COOLANTS • LP-GAS

SINCE 1915 — REPRESENTATIVES IN PRINCIPAL CITIES — QUICK-CONNECTIVE FLUID LINE COUPLINGS

THE HANSEN MANUFACTURING COMPANY

4031 WEST 150th STREET • CLEVELAND 35, OHIO

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Epoxy-Concrete Layout Plates

(Continued from page 116)

is filled with epoxy. If a void is found, epoxy is forced in until it will take no more.

Epoxy is allowed to cure overnight and then the concrete slab is removed from the granite plate. A sharp blow with a heavy mallet is used to break the seal between the epoxy and the granite. The new epoxy resin-concrete surface plate is then set on a standard surface plate support and the protruding pipes are cut off even with the sides of the slab. The plate is then ready.

Plates in use at the Ordnance Department are 13 in. thick, 8 ft long, and 5 ft wide. They are accurate within 0.002 in. Large weldments, as shown in Fig. 1, weighing several tons, are being processed almost daily with satisfactory results. Except for slight chipping which has not been at all critical, the plates are standing up well. It has not been necessary to resurface the plates yet, but it is estimated that it can be accomplished at 1/10th the original plate cost.

Since the epoxy resin-concrete surface plate has proved suitable for most layout jobs, we feel that the cost saving has entirely justified its construction. **End**

Want Tear Sheets?

If you would like tear sheets of any articles appearing in this issue, just drop a line to The Editor, Plant Engineering, 308 East James St., Barrington, Ill.

Stop these maintenance miseries (and others) in your plant...

Molysulfide T.M.

is the cure!

Sure, problems like frozen nuts and galled spline drives won't put you out of business—but they'll put a crimp in your important maintenance schedules! The answer?

Molysulfide paste lubricants! These special lubricants—containing 25-70% Molysulfide—are tailor-made for the toughest maintenance-lubrication problems you've got. Here's why . . .

Molysulfide films out on metal surfaces. It forms a *rugged, heat- and cold-resistant, low-friction film* that prevents metal-to-metal contact even after man-sized hard knocks have pounded or squeezed base grease away. That's why Molysulfide *stays put* to lubricate as a long-term cure for such headaches as galling and seizing . . . stick-slip . . . chatter, fretting, and a whole host of other miseries. *But see for yourself!*

Try Molysulfide paste lubricants in your own shop. *Try just one pound*—order it from any of the manufacturers listed below. You'll agree—Molysulfide is worth its weight in aspirin! *Climax Molybdenum Co., a division of American Metal Climax, Inc., 500 Fifth Ave., New York 36, New York.*

CLIMAX MOLYBDENUM

Try a pound of Molysulfide paste lubricant for heavy-duty maintenance applications! Order it today from any of these well-known manufacturers: Acheson Colloids Co., Port Huron, Mich. • The Alpha Molykote Corp., 65 Harvard Ave., Stamford, Conn. • American Lubricants Co., 1227 Deeds Ave., Dayton, Ohio • Baso, Inc., 730 W. Jackson St., P. O. Box 461, Mil Milwaukee 1, Wisc. • Bel-Ray Co., Green Village Rd., Madison, N. J. • Bemol, Inc., 131 State St., Boston 9, Mass. • Fiske Bros. Refining Co., 1500 Oakdale Ave., Toleao, Ohio • Hohman Plating & Mfg. Co., Inc., 905 East 3rd St., Dayton, Ohio • Jet Lube, Inc., 3093 N. California St., Burbank, Calif. • McGee Chemical Co., 8000 West Chester Pike, Upper Darby, Pa. • Ore-Lube Co., 11 Front St., New York, N. Y.

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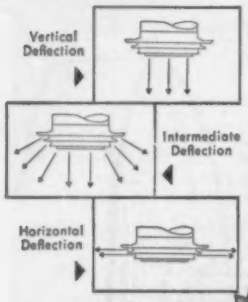
Fresh air at working level improves employee efficiency

Barber-Colman industrial Venturi-Flo diffuser permits air to be introduced at the worker's level — duct work can be extended to provide a 10' mounting height. This prevents stagnant, smoky air, which has collected near the roof, from being mixed with the incoming fresh air. Employee comfort and efficiency are improved considerably.

The Venturi-Flo industrial diffuser can be adjusted easily from the floor to deliver any air pattern. In warm weather, the air should be delivered close to, or even directly at, the worker; while during cool evenings, or



in cold weather, the air should be diffused above the head of the worker, providing ventilation without drafts.

A complete range of sizes available to meet any industrial requirement. Ask for Bulletin F-7722-1. Call your Barber-Colman Field Office or write:

BARBER COLMAN

BARBER-COLMAN COMPANY

Dept. W, 1139 Rock Street, Rockford, Illinois

For more facts circle 664 on Reply Card

New Plant Construction

(Continued from page 142)

sible quick deliveries of company products to the eastern seaboard and to the New England states. Work on the new facility will get under way soon for completion by early 1961.

Woodbridge, N. J.—Ronson Corp. plans to construct a liquid packaging plant along the Garden State Parkway here, near company's new home office recently completed. Facility will be a one-story brick and steel structure with 33,000 sq ft for manufacturing, administration, warehousing, research and development. It will be used principally for packaging gas multi-fills for Ronson lighters, lighter fluid and other company products. Plant and equipment, under supervision of the Becker Construction Company, will cost approximately $500,000.

Waterville, O.—Johns-Manville Corporation, 22 E. 40th St., New York City, N. Y., plans expansion of facilities here for glass fiber manufacturing and at a similar installation at Parkersburg, W. Va. Work is already under way for expansion of both facilities which should be completed early next year.

Homestead, Pa.—United States Steel Corp., 525 William Penn Place, Pittsburgh, Pa., plans to increase the heat-treating capacity for alloy steel plate at company's 160-in. plate mill located here, by the installation of a second continuous quenching and tempering facility. New line will be almost identical to the initial installation with a few improvements and will take about a year to install.

Merwin, Pa.—Aluminum Company of America, Alcoa Building, Pittsburgh, Pa., plans to construct a multi-million dollar research and development center, 26 miles east of Pittsburgh. Ground will be broken in a few months for the first installation and the ensuing complex of facilities for the pursuit of science, culture and technological accomplishment, will take a period of years for completion. The center will represent an investment in excess of $30 million.

Mountaintop, Pa.—Radio Corporation of America, 30 Rockefeller Plaza, New York, N. Y., will start construction of a 120,000-sq ft plant on large building site located here for the production of semi-conductor devices. Work on the new structure will begin at once for completion by mid-1960.

Oil City, Pa.—Jones & Laughlin Steel Corp., 462 Gateway Center, Pittsburgh, Pa., has completed work on company's electricweld tube division. Division also plans to add another 25,000 sq ft of floor space to its main building for expansion of storage and production facilities.

JOIN TWO LENGTHS SIMPLY BY SCREWING

No more collars or clamps! Wiremold Air Duct forms a joint *as firm and strong as the duct itself*. Only Wiremold's exclusive construction makes this possible. Spiral of one length fits, snug as a screw, into spiral of other length. And, air flow is not restricted. Save job time; save odd lengths for neat use on next job. Write for full story, or ask your DISTRIBUTOR.

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Engineered Atmospheres for Better Processing

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Uniform Low Cost Heat for Processing and Space

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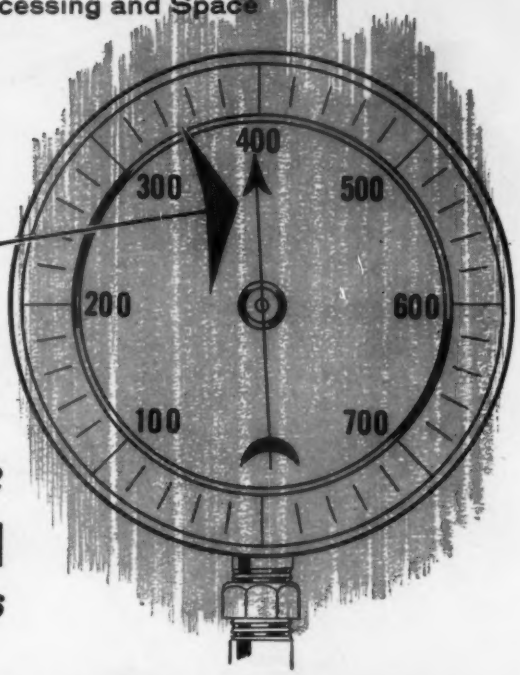
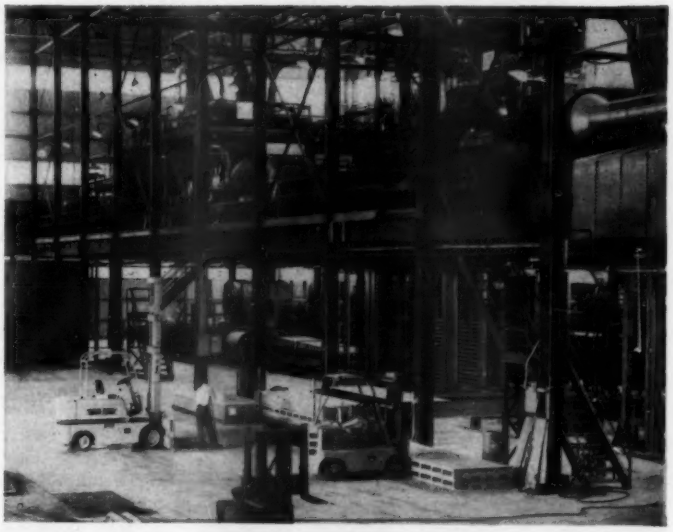


In the production of high quality shaving board, two major uses of controlled heat are required: platten presses and dryer. In each very little tolerance in temperature is allowed. At the Timblend Plant of Roddiscraft, Inc., at Arcata, California, for example, the temperature in the presses must be held at 290°F and in the dryer at 400°F with less than ±4°F variation in each.

When Ross Engineers took over the design of the heat service for this operation they had several heating media from which to select. The SUPERTHERM High Pressure Hot Water System offered the greatest advantages. It offered exceptional economy of installation and heat use, uniformity of delivered heat, and low maintenance.

Now in service for over two years, the records show that the SUPERTHERM System is doing just what it set out to do.



If you need a controlled process temperature up to 400°F or over, or combined heating and cooling or extensive space heating, you should consider the SUPERTHERM. In general, existing boilers can be utilized. In fact, many installations show a reduction in the number of boilers that must be kept in service.

M-R

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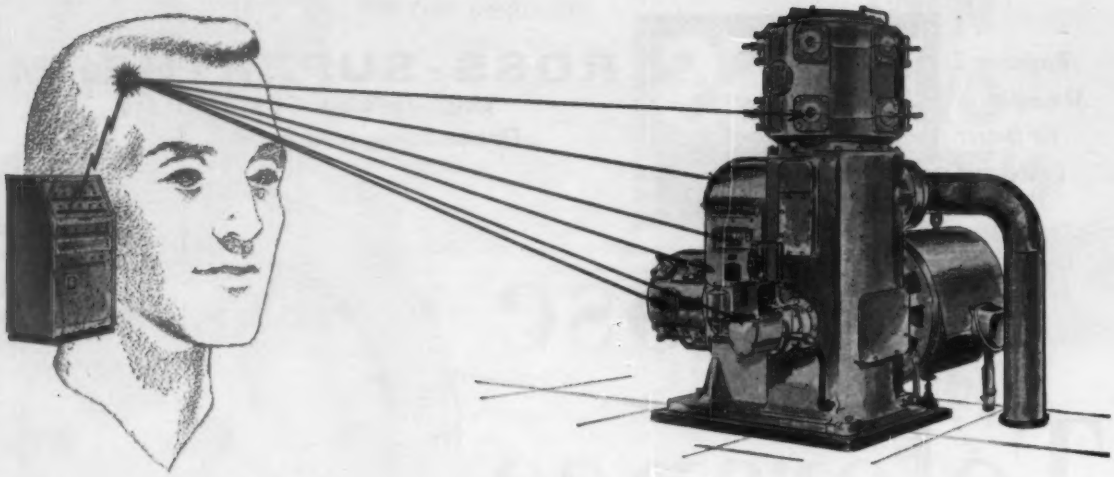
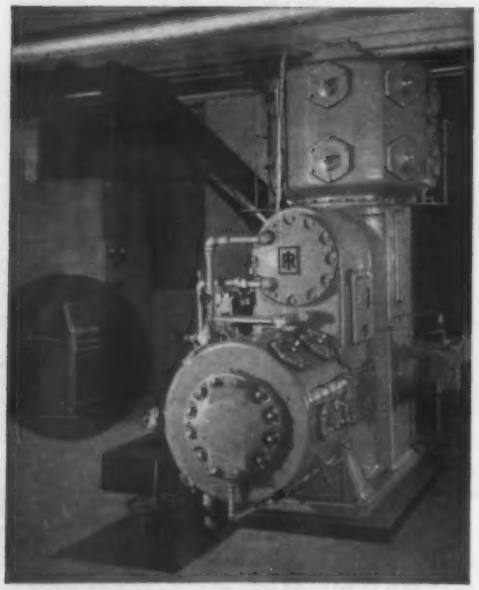


Making a Compressor "Think for Itself"

New 'Tendamatic control brings automatic supervision to the COMPRESSOR PLANT



'Tendamatic control of this Ingersoll-Rand type XLE two-stage heavy-duty air compressor assures maximum protection of capital investment, maximum manpower utilization, continuity of production and lower maintenance expense.

INGERSOLL-RAND's new *'Tendamatic* control is like a *tireless attendant*, who keeps checking the operation of your compressor every second.

All you need to do is push the start button; the 'Tendamatic does everything from then on. Its built-in safeguards eliminate routine inspection and supervision, detect trouble before it can do any harm to the compressor, and put all maintenance on a low-cost *preventive* basis.

This completely automatic control system keeps an eye on air pressure and temperatures... lubricating oil pressure and temperature... the cylinder lubricator... and the float level in the condensate trap. It watches for leaking valves and mechanical failure of running parts.

Any time there is a variation from normal operation, the 'Tendamatic identifies the nature of the malfunction and gives audible *and* visible warnings. If the warnings are ignored or forgotten, 'Tendamatic shuts down the compressor before any damage can result.

To plan now for future savings, ask your Ingersoll-Rand representative for complete information on the new 'Tendamatic compressor control.

'Tendamatic control is available only on Ingersoll-Rand air and gas compressors

Ingersoll-Rand

1-873 11 Broadway, New York 4, N. Y.

GAS & DIESEL ENGINES • PUMPS • AIR & ELECTRIC TOOLS • CONDENSERS • VACUUM EQUIPMENT • ROCK DRILLS

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ADVERTISED PRODUCTS, SERVICES

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BULLETINS

(Begins on page 21)

142 **Economical Ash Handling**—Introduced in this bulletin is the Econo-Ash system, pre-engineered to handle 2 to 6 tons of ash per day and prefabricated to sell for about a third the cost of other systems. Text stresses advantages offered smaller plants and explains operation. The Allen-Sherman-Hoff Co.

FENCING

143 **Chain Link Fence**—Advantages of Realock steel and Realock aluminum chain link fence featuring minimum maintenance are detailed in this product folder. A variety of industrial and other applications are illustrated. The Colorado Fuel and Iron Corp.

144 **Aluminum Fencing**—Booklet BI-439, 12-pp, lists complete availabilities, illustrates various fence components, accessories and discusses design considerations of aluminum fencing. Chain link fencing basically includes supporting posts anchored in the ground, fence fabric attached to posts, standard accessories used to attach, stretch, brace or finish the fence fabric. Kaiser Aluminum & Chemical Sales, Inc.

CONSTRUCTION

145 **Pre-Mixed Mortar**—The best method for achieving tough, strong, non-shrink water-resistant joints and masonry repairs is explained and illustrated in Bulletin EPMM-2B. Advantages of the pre-mixed mortor are detailed, as well as instructions for use, comparative compressive strength test results. The Master Builders Co.

146 **For Masonry Anchoring**—Catalog 25 is a 48-pp pocket-size handbook of anchoring and drilling devices for fastening anything to masonry. Includes tables showing proper anchors to use with each type of fixture and material, and gives dimensions etc. The Rawlplug Co., Inc.

147 **Grouting Methods**—Effective methods for grouting the different basic types of heavy industrial equipment are explained with text and photos in 8-pp Bulletin EPMG-2A. Advantages of pre-mixed grout are explained, and diagrams, charts and photos cover preparatory steps, forming, selecting materials, mixing and placing. The Master Builders Co.

149 **Iron-Impregnated Floor**—Discussed in 24-pp Bulletin Mp-4d are major features sought in the design of any industrial floor subject to heavy use, such as wear and corrosion resistance, economy, spark resistance, static-dissemination, color, easy maintenance. Photos, diagrams and text cover method of application and typical installations of the Iron-Clad concrete floor. The Master Builders Co.

150 **Curtain Wall Construction**—Design and construction features of company's anodized aluminum movable interior partitions are illustrated and described in this product bulletin. Installation method is shown and specifications included. Aluma-Wall Partition Co.

151 **Fire-Shield Plaster**—Technical Bulletin 3753 describes a fire-shield plaster for fireproofing steel decks and supporting beams. Complete directions for applying are included, along with other data. National Gypsum Co.

HEATING

152 **For Heating, Ventilating**—Performance and dimensional data on a line of ventilating and heating equipment is presented in 8-pp Bulletin S-317. Featured are centrifugal fans, centrifugal roof ventilators, propeller roof ventilators, propeller fans, wall mounted fans, various unit heaters. Ilg Electric Ventilating Co.

153 **Water Heaters**—Large volume water heaters designed to supply hot water for all types of high demand installations are featured in 26-pp Form CH-650. Describes copper coil heaters, underfired heaters, tanks and accessories, and includes sizing data, recovery data, piping diagrams, tank hook-ups, typical installations. The Cleveland Heater Co.

154 **Door Heaters**—Bulletin DH-59 describes high velocity door heaters for steam or hot water systems, to be mounted inside and above doors which must frequently be opened regardless of outside temperatures. Dimensional data and other engineering data included. L. J. Wing Mfg. Co.

INSTRUMENTS, CONTROLS

155 **Electronic Controls**—Eight-pp Bulletin A-913 describes electronic control equipment with integrated building-block system components designed for the process and power industries. Illustrated chart has major system components arranged functionally for given process variables. The Swartwout Co.

156 **Construction Services**—Bulletin 107, 16-pp, describes and illustrates company's installation through start-up service for automation and instrumentation systems. Services include a contract organization furnishing installation drawings, installation of panels, field instruments, field interconnections, commissioning, operator orientation and supplementary instrumentation personnel where needed. Panellit Service Corp.

157 **Mass Flowmeter**—Bulletin GEA-6925, 8-pp, describes theory, operation and advantages of industrial flowmeter that measures flow of fuels, industrial liquids, and gases directly in pounds. Includes ranges, specifications and dimensions, and cutaway drawings illustrating principles of operation. General Electric Co.

158 **In-Plant Temperature Controls**—Use of precision temperature controls in industrial plants is covered in this 8-pp bulletin. Line drawings show how controls are used in gas exhaustion chambers, tempering tanks, pipelines, test ovens, plating tanks, electrostatic sprayers, as well as air temperature and radiant heat applications. Fenwal, Inc.

159 **On Unit Ventilator Control**—Described in this unit ventilator control application manual, about 88-pp, are manufacturer's automatic control systems for hot water, steam, gas-fired and electric unit ventilators. Actual control applications are shown on each page, covering many makes and models marketed by major unit ventilator companies. Complete cycles of operation, damper sequence charts, specifications for precise temperature control and installation data are included for each. Barber-Colman Co.

160 **Malfunction Detector**—Technical Bulletin RF-586 describes a malfunction detector designed to provide maximum protection for large motors, pumps, compressors and other rotating equipment by responding to mechanical malfunctions the instant they occur. Specifications are included, as well as diagrams and dimensional data. Aeronautical and Instrument Div., Robertshaw-Fulton Controls Co.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on pages 251 and 252.

161 **Trip Control**—Described in 16-pp Catalog 65b is a trip control for manual operation of industrial power machines. Features and advantages are detailed, and different trip controls for various power machines are described. Micro Switch, Div. Minneapolis-Honeywell Regulator Co.

162 **Industrial Weighing Systems**—This series of four folders covers the basic art of weighing, accuracy in weighing systems, the "rolling ball" head and the instrumentation used with modern weighing systems. Photos and schematic diagrams illustrate the text. The A. H. Emery Co.

163 **Automatic Weighing System**—The automatic measurement and control of bulk materials through unitized weighing systems of pre-engineered components is the subject of 24-pp Catalog 14. Explains application of company's standardized system of instrumentation to batch and continuous weighing methods, and includes chart of major components graphically showing overall control capability of weighing systems. Weighing & Control Components, Inc.

164 **Tiny Electric Eyes**—Sixteen-pp Bulletin 571 describes miniaturized electric-eye applications for counting, sorting, monitoring, assembling and automatic weighing. Equipment ranges from direct or partial cut-off

BULLETINS

(Begins on page 21)

to reflector type units. Bulletin contains section dealing with specific in-plant installations. Numerous schematics show versatility of these electronic instruments. Also provided are dimensions, and data on circuitry, speed, relays. Photomation, Inc.

WELDING AND MACHINE SHOP EQUIPMENT

165 **Machinery Maintenance Equipment**—Catalog No. P-9, 24-pp, contains descriptions of pulling systems, photographs showing Grip-o-matic and push-pullers, Power-Twin "center hole" rams, pumps and hydraulic shop presses and shows how these units remove and install gears, bearings, pulleys, shafts and couplings simply and quickly. Illustrations and descriptions of heavy duty industrial wrenches. Owatonna Tool Co.

166 **Optical Equipment**—This 26-pp catalog covers equipment for production tooling, machine alignment, quality control and inspection, including jig transits, alignment telescopes, collimators, sight levels and line of sight telescopes, instrument testing equipment, etc. Technical descriptions are provided. Keuffel & Esser Co.

167 **On Welding Equipment**—This 40-pp manual covers company's full line of gas welding, cutting and allied equipment. Book is arranged in six sections and with it is a 6-pp full-color insert showing cutaways of major products. In addition to equipment pictures and description, this manual carries charts and technical data. One section is devoted to flow capacity curves for gas pressure regulators. Smith Welding Equipment Corp.

168 **Steel Welding Guide**—This 26-pp booklet includes a heat input calculator for use in welding T-1 steel—a circular slide rule which determines correct heat amounts as related to amps, volts and speed of the welding arc. Booklet discusses rules to follow in welding T-1 steel and covers facts on the metal, electrodes to use, and welding procedure. United States Steel Corp.

169 **Band Saw Machine**—Features and advantages of company's heavy-duty band saw machine designed for fast production sawing are detailed in 6-pp Form 502. Machine specifications and tables showing comparative cutting times and other performance data are included. The Henry G. Thompson & Son Co.

170 **Grinding Wheel Recommendations**—Over 1600 abrasive wheel recommendations for grinding everything from agate to zirconium are set up in alphabetical order in this Specifications Catalog, about 57-pp. Material, work, operation—with their respective recommendations on abrasive, grit, grade and bond—are listed. The Carborundum Co.

171 **Vibration Mounts**—Featured in this 8-pp bulletin are vibration mounts employing the principle of "rubber-in-shear" to provide vibration isolation and acoustics control. Engineering details, performance data and installation information are described and illustrated with diagrams and tables. Hamilton Kent Mfg. Co.

172 **Controlled Barrel Finishing**—Featured in this 36-pp booklet is a seven-point system for scientifically controlled barrel finishing. Sets forth the type of media; ratio of media to parts; load height; water; compounds; barrel speed; and tumbling time, and describes a complete line of finishing equipment. The Carborundum Co.

Recent Publications on Versatile Modern Materials

173 **Silicone Rubber Compounds**—Product and application data on RTV (room temperature vulcanizing) silicone rubber compounds is provided in 12-pp Bulletin CDS-170A. These compounds are used for potting and encapsulating of electrical and electronic equipment, for high low temperature sealing, other applications. Booklet contains recent information on proper product properties and data for RVT compounds -20, -40, -60 and -90 and silicone rubber sponge. Also gives suggestions for handling compounds. General Electric Co.

175 **On Rigid PVC**—Catalog RV-59, 24-pp, gives detailed information on rigid polyvinyl chloride products, their properties and applications. Presents data on plate, joining accessories, extrusions, bolts and nuts, and calendered sheeting. Includes chapters covering physical properties and chemical resistance of rigid PVC. A section on applications, illustrates use in exhaust hoods and ventilating equipment etc., lists industries in which it is particularly advantageous. Kaykor Industries, Inc.

176 **Nylon Shapes**—How the properties of nylon can be utilized in fabricating stock shapes for a variety of industrial applications is told in 8-pp Bulletin BR-2M. Case histories cover such applications as bearings, gears, rollers, wheels, fixtures, etc., for the various industries. The Polymer Corp.

LUBRICATION

177 **Oilers, Oil Controls**—Circular 580 describes bottle oilers, oil cups and constant level oil controls. It is packed with illustrations, application data, and dimensional specifications covering automatic oil level controls; bottle oilers for plain bearing lubrication; glass body and aluminum body oil cups. Lunkenheimer Co.

178 **Electrical, Lubricating Aids**—Condensed Catalog 59 contains 12-pp packed with descriptive data covering types and use of company's electrical and lubricating devices, and includes recently developed products. Presents automatic oilers, chain oilers, mist systems, industrial fuses and fuse accessories. For easy reference, all items are listed with catalog numbers, capacities, sizes. Trico Fuse Mfg. Co.

ELECTRICAL

179 **Motors and Generators**—Featured in this 6-pp bulletin are squirrel-cage a-c motors, special purpose motors, wound-rotor motors, direct current motors, generators and motor-generator sets. Photos and descriptions of the various models are included. The Imperial Electric Co.

181 **Circuit Breaker Accessories**—Twelve-pp Bulletin GEA-6757 describes a line of industrial molded case circuit breaker accessories and modifications for a variety of control applications. Includes detailed selection data, specifications and outline drawings. General Electric Co.

182 **Low Maintenance Resistors**—Bulletin 6715 shows construction features of Tab-Weld resistors and explains how these features contribute to minimum maintenance. Also included is selection table covering ratings from 13 to 500 amp continuous for various section lengths. These resistors are suggested for severe-duty jobs where vibration-proof, nonbreakable construction is important. The Electric Controller & Mfg. Co., Div. Square D Co.

183 **Safety Switches** — Front-operated light, standard and heavy duty safety switches are presented in 8-pp Bulletin. Contains information necessary for specifying and ordering safety switches, including dimensions, capacities, voltages and horsepower ratings. Frank Adam Electric Co.

184 **Combination Starters**—Publication ED-30, 8-pp, covers non-reversing combination starters through NEMA size 4. Data provided includes descriptions, photos and enclosure dimensions for popular combination starters with either motor circuit switches or circuit breakers. Cutler-Hammer Inc.

185 **Interrupting Capacity Chart**—This chart enables users of circuit breakers to select and order the proper breaker for each application. In addition to interrupting ratings chart, tables of available fault currents are included. Westinghouse Electric Corp.

186 **Tips on Connectors**—Although small enough to fit in a billfold, this little 36-pp booklet gives about 25 time-saving applications of company's Pres-Sure connectors for solderless wire splicing and terminating. Illustrated with over 70 drawings, gives easy-to-follow examples of jobs that can be done with just one hand crimping tool. Includes chart of approved wire combinations. Buchanan Electrical Products Corp.

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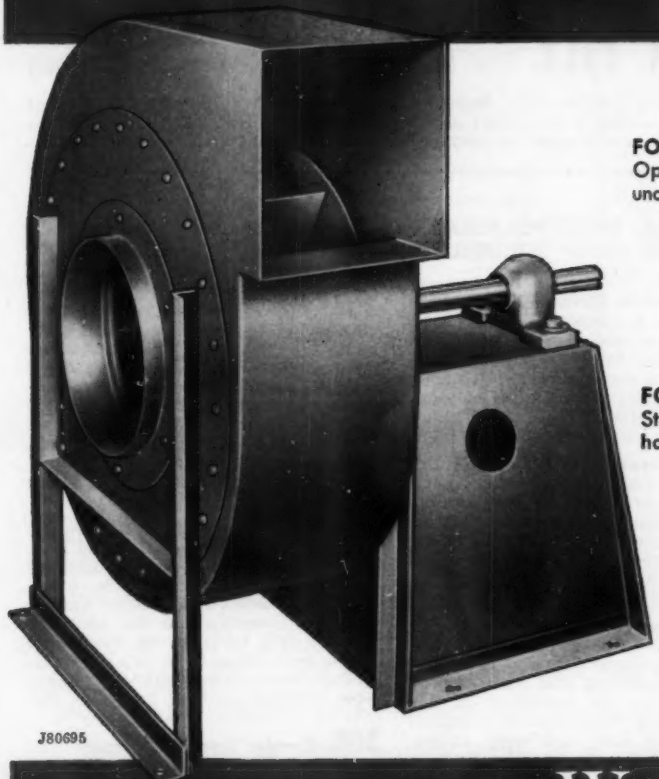

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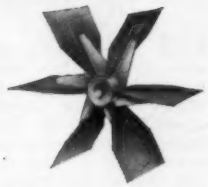

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BULLETINS

(Begins on page 21)

187 Why Plastic Conduit—Advantages of using plastic conduit in a variety of electrical applications are detailed in this 6-pp bulletin. Mechanical, physical and electrical properties and other specification data are tabulated and installation discussed. Southwestern Plastic Pipe Co.

188 Stationary Batteries—Instructions for installing and operating stationary-type industrial storage batteries—particularly lead-antimony alloy batteries of low specific gravity—are presented in 12-pp Form 4676. Tables of ratings, photos and drawings included. Exide Industrial Div., The Electric Storage Battery Co.

190 Lighting Supports—Channel type lighting supports for installing wiring and electrical lighting fixtures are described in 8-pp Bulletin G-2. Recommendations for applications, installation procedures, features and data are covered, and photos, dimensional data and specifications included. Steel City Electric Co.

191 Hook-On Volt Ammeter—Bulletin GEA-6292C gives description, specifications and construction details of company's pocket-size, hook-on volt ammeters for testing a-c voltages. Lists applications, current ranges, accuracy percentage and gives operating instructions. General Electric Co.

OTHER EQUIPMENT

192 Storage Equipment—Design and construction features of company's line of steel storage and shop equipment are illustrated and described in 16-pp Equiptogram 305. Details on a construction angle for assembling a variety of structures are also given. Equipto, Div. Aurora Equipment Co.

194 On Zeolite Softeners—This water conditioning data sheet, "The Care and Operation of Zeolite Softeners" covers bacterial fouling, deposits encountered and operational factors in relation to this equipment. It tells too, how exchange materials should be handled to maintain maximum efficiency and longer equipment service life. Betz Laboratories, Inc.

195 Adhesive Bonding of Aluminum—Principles and procedures involved in the adhesive bonding of aluminum are explained in this 20-pp bulletin. Covers design of joints, types of adhesives for aluminum, processing of adhesive joints, typical applications, and includes tabular data and illustrations. Reynolds Metals Co.

196 For Air Supply Lines—Sixteen-pp Catalog 227 illustrates and describes an expanded line of air supply line accessories. Presents sockets, plugs, hose clamps, fittings and tools, all interchangeable with most standard makes. Gives specifications. Lincoln Engineering Co.

197 Sound Motion Pictures—This 16-pp audio-visual information booklet outlines use of sound motion picture projectors in sales promotion, public relations, job training and recruiting work, with examples of how some firms use the media. Costs and relative values of sound films in industrial applications are covered, along with information on free film library services. Bell & Howell Co.

198 Engineering Symbols—A method of using an electric typewriter for quick, convenient typing of special symbols and equations needed in the field of engineering is the subject of this 8-pp bulletin. Describes variety of symbols which can be snapped into place on typewriter. Remington Rand Div., Sperry Rand Corp.

199 Data On Solvents—Properties and uses of glycol-ether solvents are described in this 40-pp bulletin. Contains comprehensive data on 14 glycol-ether solvents, including physical properties, chemical derivatives, and use possibilities, storage and handling, physiological properties, specification limits, and test methods. Bibliography and reference section is included. Union Carbide Chemicals Co., Div. Union Carbide Corp.

200 Using Specialty Steels?—An excellent reference source, this 40-pp guide to selection of specialty steels, contains information on tool and die steels; stainless steels; high temperature alloys; electronic; magnetic and electrical alloys; special purpose alloy steels; tubing and pipe, fine wire specialties. Includes tool steel selector chart providing a system of matching tool steels. The section on electronic alloys contains graphs comparing expansion characteristics, electrical resistance, permeability and magnetic flux density of various metals. The Carpenter Steel Co.

201 Industrial Electronics Equipment—Catalog 190 A, over 500-pp, contains illustrations, specifications and prices on electronic tubes, industrial paging and intercommunication systems, test equipment, meters, industrial closed circuit television, radio control for plant doors, switches, relays, connectors, and photoelectric controls. Product index and separate manufacturers index provides easy access to any one of thousands of electronic devices or parts listed in this catalog. Allied Radio Corp.

DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided on pages 251 and 252.

TOOLS, WELDING, AND MACHINE SHOP EQUIPMENT

301 Portable Electric Tools—Form 10 features a complete line of portable electric tools including drills, screw-drivers, impact wrenches, magnetic drill presses, sanders, grinders, hammers, holesaws, and forged tools. The Black & Decker Mfg. Co.

303 Hydraulic Power Tools—Bulletin A-5-58 covers independent pump hydraulic jacks, single and double plunger hand pumps and double acting air engine pumps. Advantages are detailed, typical applications discussed. H. K. Porter Co., Inc.

304 Power Tools—Industrial construction and other portable power tools for the manufacturing, construction, woodworking and metal-working industries are described in this 55-pp catalog. Tools appear in logical sequence of size and duty rating. Skil Corp.

305 Pipe Tools—Ordering and application information on Rigid pipe tools is provided in 16-pp illustrated Catalog 7596R-6. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives. The Ridge Tool Co.

306 Industrial Tools—Information on a complete line of industrial tools, including 500 new types and sizes never before offered, is presented in 120-pp Catalog 57. Included are complete lines of wrenches, socket wrenches, drop forged clamps, tool holders, set up and hold down tools, cutting tools and pipe tools. Photos, drawings and numerous charts aid selection. Armstrong Bros. Tool Co.

307 Masonry Bits—Catalog M B C-56 describes carbide-tipped masonry bits for drilling holes in tile, brick, concrete, granite or any other kind of masonry. Specifications are included, as well as a table giving chuck and shank requirements to adapt to different electric or pneumatic hammers. New England Carbide Tool Co., Inc.

308 Powder Actuated System—Two booklets cover applications of a powder actuated fastening system. One booklet shows how it can be used for plant maintenance—fastening conduits, bus ducts, junction and outlet boxes, surface raceways, fixtures

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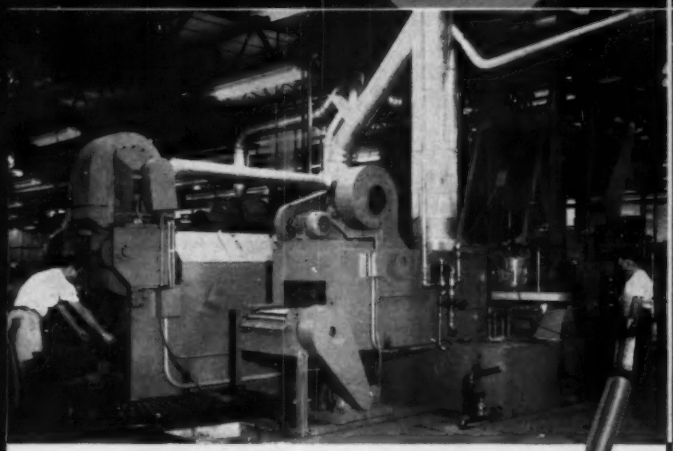

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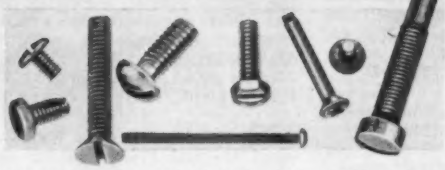

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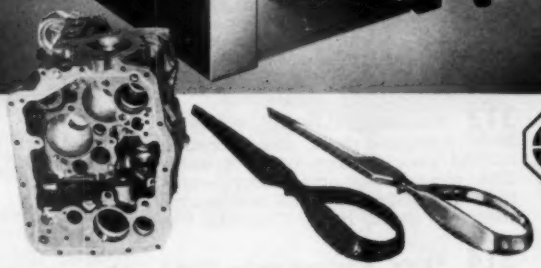

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DATA FILE

(Begins on page 256)

and frames, etc. The second booklet indicates the correct fastening and charge to use. Ramset Div., Olin Mathieson Chemical Corp.

310 Machining Aluminum—This 32-pp booklet provides data on aluminum practices, tool angles and designs, and tool materials. Proper speeds, feeds, lubricants and cutting compounds are explained, and charts covering major machining operations—turning, milling, shaping and planing, drilling, reaming, tapping, others—are included. Reynolds Metals Co.

311 Hydraulic Jacks, Pullers—Bulletin Hydraulic-56, 16 pp, features company's line of hydraulic jacks and pullers. Prepared as an application guide for using various high-pressure jacking and pulling tools, it contains full descriptions, mechanical specifications. Templeton, Kenly & Co.

312 Welding Positioners—Illustrated and described in 16 pp Bulletin P-28 is a line of welding positioners ranging from 3000 to 100,000 lb capacity. Features and advantages are detailed, and dimensional diagrams, and load tables included. Harnischfeger Corp.

313 Vibration Control—Bulletin 59-05 contains shock and vibration control data. Various types of isolation mounts for machinery, commercial applications, and test equipment are listed. Barry Controls, Inc.

314 Shop Equipment—Work benches, tool stands, shelving and other pressed steel equipment for the shop, laboratory and assembly line are shown in 8-pp Form 2299. Construction features and specifications of size, top material, equipment variations. Standard Pressed Steel Co.

315 Data for the Shop—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44-pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. Coversion tables, steel numbering systems, machinability ratings. Standard Oil Co. (Ind.)

MECHANICAL POWER TRANSMISSION

316 Fluid Drive—Eight-pp Bulletin 9819 describes and illustrates adjustable speed Gyrol fluid drives, 1- through 25-hp, giving advantages and applications. Components and operation are also covered in detail. Industrial Div., American-Standard.

317 Power Transmission Products—Catalog 759 contains 104-pp of engineering data, specifications and prices on roller chain, sprockets, couplings and conveyor chain. Data includes material on selection of roller chain drives, speed ratios for sprocket combinations, chain length tables, illustrations of various standard attachments, and technical specifications. Diamond Chain Co., Inc.

318 Pillow Blocks—Both plain and water cooled pillow blocks designed for a wide range of industrial applications are featured in Bulletin A401D. Features are illustrated and diagrammed, and dimensional data and prices furnished in tables. Dodge Mfg. Corp.

320 Anti-Friction Bearings—Catalog 424-B entitled "The broadest line in the anti-friction field," is an 8-pp folder giving capsule presentation of company's entire product line. A brief description of each product is provided. SKF Industries, Inc.

321 Flexible Couplings—Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings. Thomas Flexible Couplings Co.

LUBRICANTS, LUBRICATION

322 Lithium Greases—This product information bulletin presents manufacturer's six Litholine industrial greases, stressing industry advantages offered by these multi-purpose greases. Gives properties of greases, application and performance characteristics. Sinclair Refining Co.

323 Organized Lubrication—Benefits of organized lubrication—major cost control factor are extolled in this 24-pp bulletin. Cost control opportunities are detailed and the task of assigning responsibilities and delegating authority in an organized lubrication system discussed. Method of determining savings and setting up records to measure results covered. Texaco, Inc.

324 Lubricant Data—Characteristics, advantages of company's line of specialized fluid and grease type lubricants are described in 32-pp Data Book 59-1. Includes sections on control of friction, use of grease type lubricants, proper applications, and recommendations for various operating conditions. Lubriplate Div., Fiske Brothers Refining Co.

325 Oilers and Safety Cans—Catalog 60-C, covers company's complete line of oilers and oil and gasoline containers. Photos and drawings, as well as specification data and prices are included, and replacement parts are identified and pictured. An attached analysis sheet furnishes descriptive data. Eagle Mfg. Co.

326 Product Guide—This handy little booklet gives information on manufacturer's line of industrial products—general lubricants, greases, diesel lubricating oils, metalworking oils, hydraulic oils, heat-transfer oils, waxes, petro-chemicals, spray oils, solvents, others. Sun Oil Co.

FILTRATION EQUIPMENT

327 Filters for Industry—Illustrated and described in this product bulletin are filters for a variety of applications in industry. Among those covered are liquid filters, intake filters, pipe line filters, dry and viscous panel filters, precipitators, Electro-Staynew mist collector, and a dual action filter. The Dollinger Corp.

328 Filtration Equipment—Eight-pp Bulletin GEO-506 describes filtration equipment for micronic clarification of all types of fluids; lubricating and fuel oils; liquid chemicals and petro-chemicals, compressed air, carbon dioxide, and other gases; hydraulic fluids; electroplating solutions. Commercial Filters Corp.

CONSTRUCTION

329 Foundation Pipe Piles—Comprehensive information on Taylor Forge spiral-weld foundation pipe piles is presented in 24-pp Form F-5677. In addition to detailed specifications, the illustrated booklet describes a number of pipe-pile installations and includes driving logs. L. B. Foster Co.

331 Replacement Glazing—Twelve-pp Booklet PL-251 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic, Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems, this practical booklet gives properties of this sheet. Plastic Dept., Rohm & Haas Co.

332 Insulated Curtain Walls—Technical Manual 2786 contains description, details and application methods of Gold Bond Asbestostone Panels. Includes specifications as well as photographs and dimensional drawings showing construction details. National Gypsum Co.

333 Steel Floor Plate—Skid resistance and other advantages of USS multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, data on loads. United States Steel Corp.

334 Brick Floors—Bulletin E-27B contains illustrated information on brick floor installations featuring the preparation of corrosion-resistant and wear-resistant joints to reduce costly floor maintenance. Complete procedures and techniques for installation of new brick floors and repair of existing ones, using non-shrink grout detailed. The Master Builders Co.

335 Non-Slip Flooring—Algrip, an abrasive rolled steel flood plate described as non-slip even on steel inclines, is the subject of Booklet AL-29, 8-pp. Discusses safety features, fabricating. Alan Wood Steel Co.

337 Grating, Stair Treads—Bulletin 1105, 16 pp, describes construction and design advantages of company's line of interlocked grating and stair treads. Contains detailed informa-

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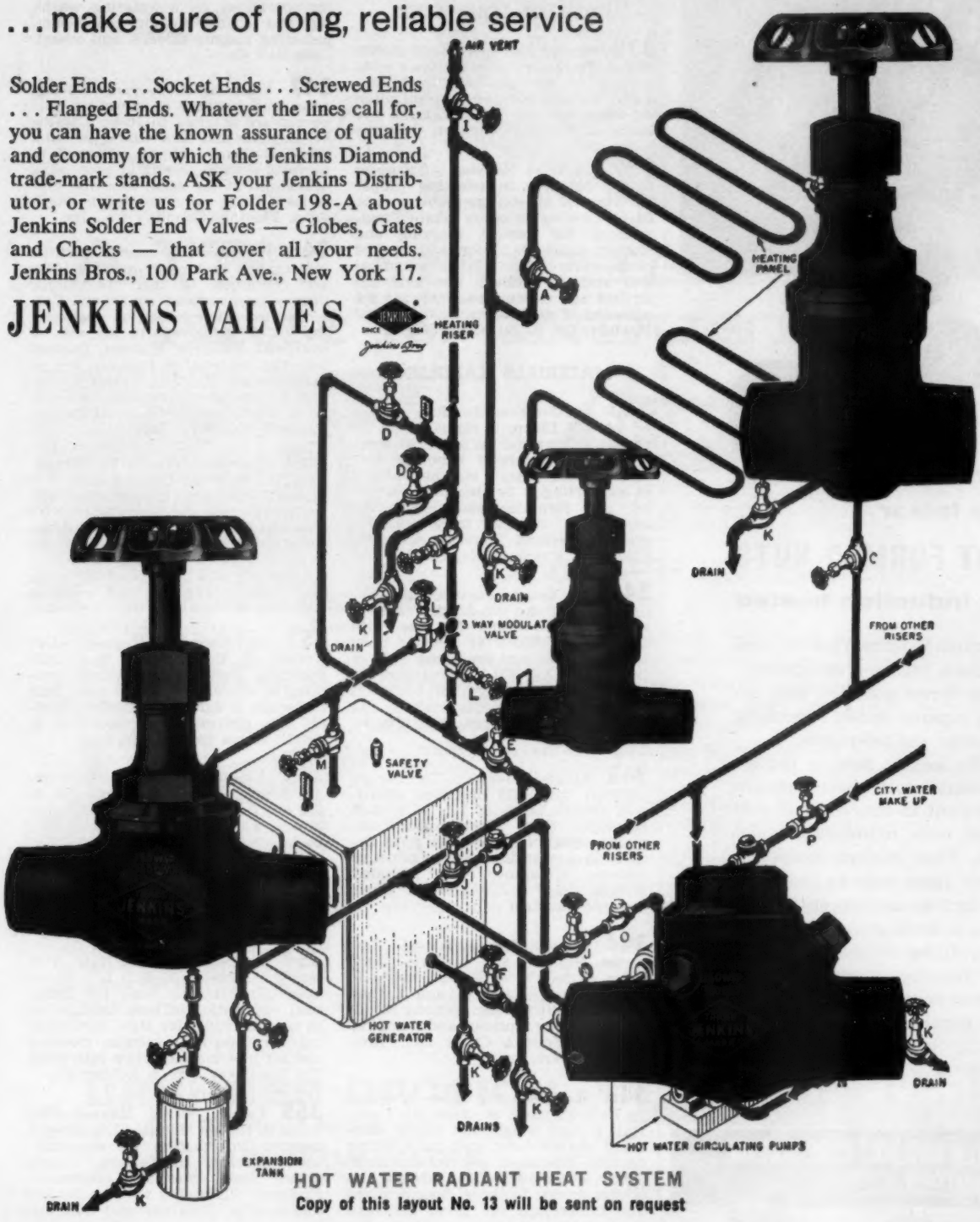

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DATA FILE

(Begins on page 256)

tion, photos, drawings and engineering data on rectangular, diagonal, radial and serrated gratings, stair treads, armoring. Dravo Corp.

STORAGE EQUIPMENT

338 Storage Racks—Bulletin R-400, 12 pp, illustrates and describes a wide variety of storage racks manufactured by the company. Application drawings, photos and diagrams are included. Chicago Tramrail Corp.

339 Guide to Shelving—To assist plant engineers in selecting proper shelving for all storage requirements, 64-pp Catalog 30 offers detailed suggestions for correct shelving and storing materials, loose and packed parts, record files. Shop equipment and storage cabinets are also described and instructions included for planning of stockrooms. Deluxe Metal Products Co. Royal Metal Mfg. Co.

MATERIALS HANDLING

340 For Overhead Handling—Booklet 2008-N 12-pp, is replete with illustrative material on principal components of overhead handling systems. Track design and advantages of supporting it flexibly are described, and formulas and figures for comparing various track systems given. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

342 Jib Crane—Features and applications of the Jib-Master, a self-supported jib crane for use with either chain block or electric hoist are illustrated and described in 8-pp Bulletin 1-N-PBM. Calculation of boom load and length of booms is covered, as well as specifications and dimensional data. Industrial Cranes, Borg-Warner.

343 Electric Hoists—Twelve-pp Bulletin DH 133D describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data included. Wright Hoist Div., American Chain & Cable Co., Inc.

344 Electric Hoists—Six-pp illustrated Bulletin 905 describes R&M Type J electric wire rope hoists in capacities of ¼, ½, 1 and 2 tons. Shows complete specifications incuding mounting options and sectional drawing. Hoist & Crane Div., Robbins & Myers, Inc.

345 Rugged Little Hoist—Twelve-pp Bulletin 158-E describes the Lodestar, a light weight but heavy duty, small electric hoist with push button control. Discusses low maintenance, safety, other advantages offered, and covers design features. Specifications and dimensions are given for both single- and double-chain models shown. Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.

346 Vibrating Screens—Featured in 50-pp Book 2777 is a line of vibrating screens designed to process a wide range of materials. Screens for a variety of applications are illustrated and described, including liquid vibrating screens, screens for scalping operations, for dewatering, washing and sizing, foundry shakeouts, pulsating magnet screens, and others. Link-Belt Co.

347 Vibrating Conveyors—Advantages and features of vibrating conveyors are detailed in 16-pp Catalog 66. Layouts and flow charts showing how conveyors can be designed to perform a wide variety of processing operations at the same time the material is being conveyed are included. Ajax Flexible Coupling Co., Inc.

348 Overhead Conveyors—Essential information and profit-making ideas are contained in this one-volume library on overhead conveyors. Collected in a single folder are engineering data, field reports on use of overhead conveyor systems, product bulletins, material on features, tips on maintenance. Pictures, charts, drawings and diagrams are also included. Available to qualified plant engineers. Rapistan-Keystone, Inc.

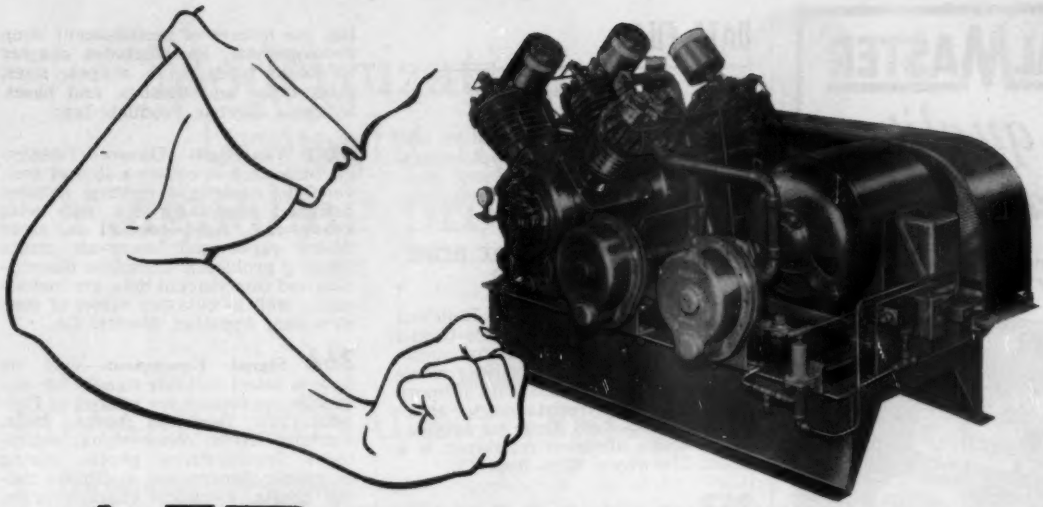
350 Continuous Power Conveyor—Featured in 64-pp Catalog A-93-R is a continuous power conveyor designed to meet the requirements for handling continuous production items. Component parts of the system, including track, chain, and suspension components, are fully illustrated and described. Installations are illustrated. Richards-Wilcox Mfg. Co.

352 Self-Dumping Hopper—Described in Bulletin 260 is a self-dumping hopper for low-cost handling of wet or dry, hot or cold, bulk materials. A variety of standard models are pictured and described in detail. Roura Iron Works, Inc.

353 Adjustable Ramps—Engineering details and other information on use and installation of company's hydraulic adjustable ramps for loading docks are featured in this illustrated bulletin. Two types of dock equipment are treated—Adjust-A-Dock, installed in loading platform or at its level, and Adjust-A-Truck, at ground level. Rowe Methods, Inc.

354 Materials Handling Hose—Presented in Bulletin S-5121 is a line of materials handling hose for industrial applications. These include use in sand blasting, for steel shot blasting, for industrial vacuum cleaners, and for blowing insulation into walls. The Goodyear Tire & Rubber Co.

355 Caster, Wheel Manual—Featured in 192-pp Manual 65 is comprehensive information on company's complete line of casters, wheels, glides, desk shoes and accessories. Profusely illustrated with photos and dimensional drawings and diagrams



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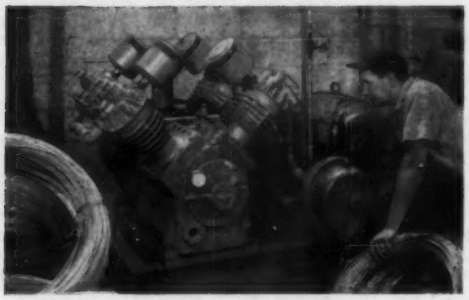

Typical installation at Conver Steel and Wire Company, New York. Used to operate spot welders, benders, paint mixers and for clamping, holding, riveting, etc.

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DATA FILE

(Begins on page 256)

of the various types of casters and wheels for a variety of applications, the manual contains tabulated engineering and price data. Darnell Corp.

SLINGS, CHAINS, WIRE ROPE AND FITTINGS

356 Slings For Industry—Bulletins 5886 and 5308-R describe Safe-Guard cable-laid slings, designed for applications where a soft sling body is required and where flexibility is more important than resistance to abrasion; and rope-laid slings for applications where abrasion resistance is a must. Macwhyte Wire Rope Co.

357 Sling Handbook—Form SL-3 is an illustrated 40-pp reference book covering more than 80 subjects on slings and fittings. Included in this revised edition is reference information condensed into handy chart form on sling types, dimensions and rated loads. Union Wire Rope Corp.

358 Self-Lubricating Chain—Bulletin SLC-57 describes and illustrates exclusive, oil-impregnated sintered bushing design feature of company's self-lubricating roller chain. Engineering data, dimensions and application covered. Whitney Chain Co.

359 Sling Chains—Seven points to consider when buying sling chains are outlined in this product Bulletin DH-101. A working load limit table is included. American Chain Div., American Chain & Cable Co., Inc.

360 Aluminum Coated Wires—Described in 6-pp Folder DH-537B are aluminized steel wire and wire products, including steel core wires, steel strand guy wire, overhead ground wire, toe wire, messenger wire, telephone wire, chain link fabric and barber wire. Properties and applications listed. Page Steel & Wire Div., American Chain & Cable Co., Inc.

361 Drop Forged Fittings—Comprehensive data on company's line of drop forged fittings for wire rope and chain are presented in 40-pp Catalog 950-2. Includes specifications, dimensions, rated capacities and weights. Crosby-Laughlin Div., American Hoist and Derrick Co.

LIGHTING, COMMUNICATION

362 Architectural Floodlighting—Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose models. General Electric Co.

364 Incandescent Lighting—The 24-pp "Incandescent Lighting Guide Book" features sections on the general advantages of incandescent lighting, the history of incandescent lamp developments, and includes chapter on basic types, bulb shapes, sizes, glass types and finishes, and bases. Sylvania Electric Products Inc.

365 Vaportight Fixture—Twenty-pp Bulletin 5-A covers a line of convertible, vaportight lighting fixtures designed especially for use with heavy-wall, rigid conduit in areas where vapor and heavy-air create lighting problems. Complete description and dimensional data are included, as well as cutaway views of construction. Appleton Electric Co.

366 Signal Equipment—Tips on how to select suitable signals for any specific operations are offered in Bulletin 100. Describes horns, bells, warning lights, other signal equipment. Specifications, photos, wiring diagrams, dimensions, audibility rating charts, electrical characteristics. Federal Sign & Signal Corp.

ELECTRICAL

367 Short, Drip-Proof Motor—Bulletin 2150 describes the drip-proof Pancake motor featuring substantial reduction in motor length. Presents engineering information on this flange type motor. A cutaway drawing shows how it achieves short length through formed end coils and housing-bearing bracket. The Louis Allis Co.

368 Drip-Proof Motors—Bulletin 857 contains 12 pp of detailed information on company's line of open drip proof and totally enclosed fan cooled motors. Construction features are described and tables of engineering data and specifications included. Brook Motor Corp.

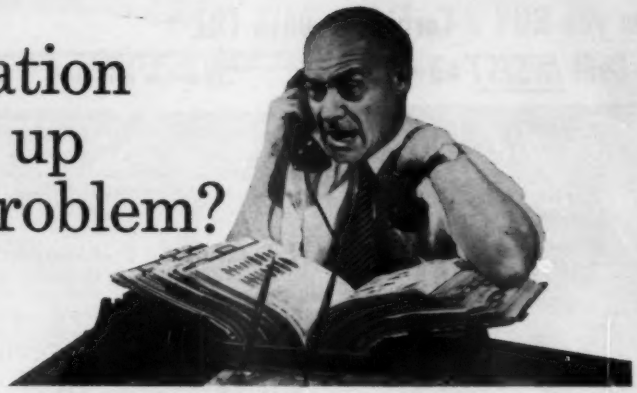
369 Motor Protectors—Questions and answers about company's built-in, three-phase motor protectors are designed to describe features and advantages of these control units. Typical applications are illustrated in Bulletin PR-1243. Metals & Controls Corp.

370 Electrical Equipment—Collected in this bound catalog is a series of bulletins on company's line of electrical equipment, including electric motors, generators, motor-generator sets, switchboards and controls. Cutaway views showing details of design and construction are included, as well as engineering and specification. The Ideal Electric & Mfg. Co.

372 Switches, Controls—Publication EA-100, 76 pp, offers quick selection data on manufacturere's line of safety switches, service control, motor control and accessories. Fully illustrated, booklet provides ordering information, brief text on applications, features, heater coil selection data, and general data. Cutler-Hammer, Inc.

373 Enclosed Switches—Catalog 83, 22-pp, Catalog 84, 16-pp, and Catalog 101, 24-pp, describe enclosed switches for industrial uses. Included are general switches designed for

Modernization brought up a signaling problem?



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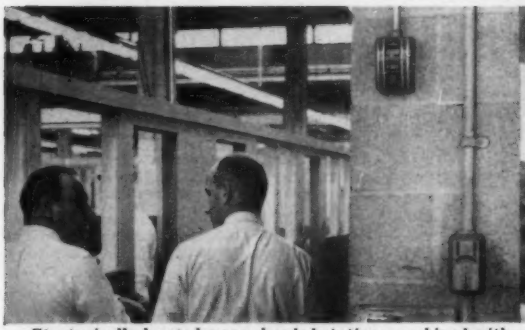
And while you're at it, ask him for your copy of the Edwards Industrial Signaling Log—a concise, informative booklet covering all aspects of industrial signaling products and what they can do for you.



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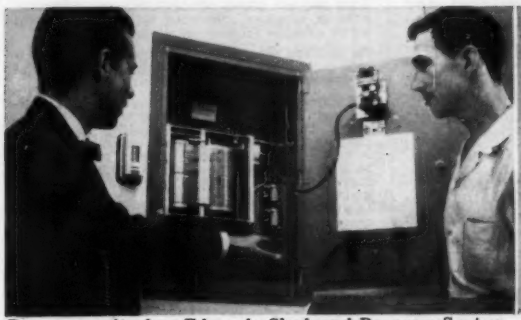
LOKATOR master selector unit—installed convenient to regular switchboard for ease in paging key personnel.



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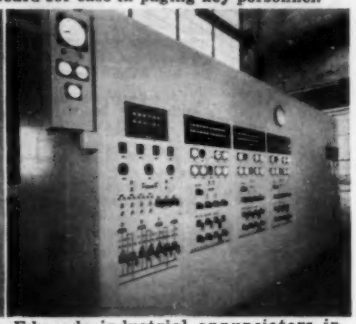

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DATA FILE

(Begins on page 254)

use on either a-c or d-c applications, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

374 Electrical Equipment — Condensed Catalog No. 9 contains 48 pp of descriptive data on company's line of electrical products, including conduit bodies, conduit fittings, connectors, ground fittings and EMT fittings. Dimensional data and features are shown. Gedney Electric Co.

375 Protective Equipment Guide— Form SPD is a 24-pp handbook on selection of protective devices for electric circuits, motors, appliances and apparatus, and is based on 1956 National Electrical Code. Besides providing suggestions on how to select right kind of protection, booklet provides wiring diagrams, motor tables. Bussmann Mfg. Co.

376 Distribution Equipment — Detailed information on company's line of electrical distribution equipment is presented in 82-pp '59 Marketeer, Catalog M-159. Among equipment described are Electrostrip multi-outlet assemblies, switches, lighting panelboards, power panelboards, switchgear assemblies, and various types of electrical duct. Tables of essential data. BullDog Electric Products Co., Div. I-T-E Circuit Breaker Co.

377 Electrical Equipment—Twelve-pp pictorial Bulletin 2706 describes fabrication and applications of company's electrical equipment, including conduit fittings, electrical equipment enclosures and devices, floodlights and traffic control. Photos show installations. Crouse-Hinds Co.

378 Electrical Equipment Digest— Electrical equipment illustrated and described in 160-pp Catalog Digest 142, includes load centers, circuit breakers, low voltage control, fusible service equipment and accessories, meter sockets and troughs, safety switches, panelboards, duct and fittings, starters. Square D Co.

379 Portable Distribution System— Described in this 30-pp Catalog PC-58 is a portable distribution system for electric lighting and power, including such applications as portable lighting, heating and ventilation equipment, welding machines, power tools, and lighting transformers. System diagrams showing how each unit fits are included. Whitney Blake Co.

381 Mineral Insulated Cable—Properties and applications of mineral insulated cable are described in this 12-pp bulletin. Method of fabrication is detailed, as well as installation procedure, construction and performance characteristics, and dimensional data is included. General Cable Corp.

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has a *complete line* of permanent non-electric

GRATE MAGNETS

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All Eriez Grate Magnets are non-electric, self-contained. Operate without any wires or attachments. Designed to prevent choking possibilities caused by bridging of iron and material accumulation. First cost is only cost. Ruggedly constructed; magnetic tubes permanently secured to frame, can't fall into flow line. No operating or maintenance costs. Available in: Wing-Type, Drawer-Type, Multiple-Bank, Rotary-Type, Odd-shaped Models, Housed Units, and Housed Vibratory Units.

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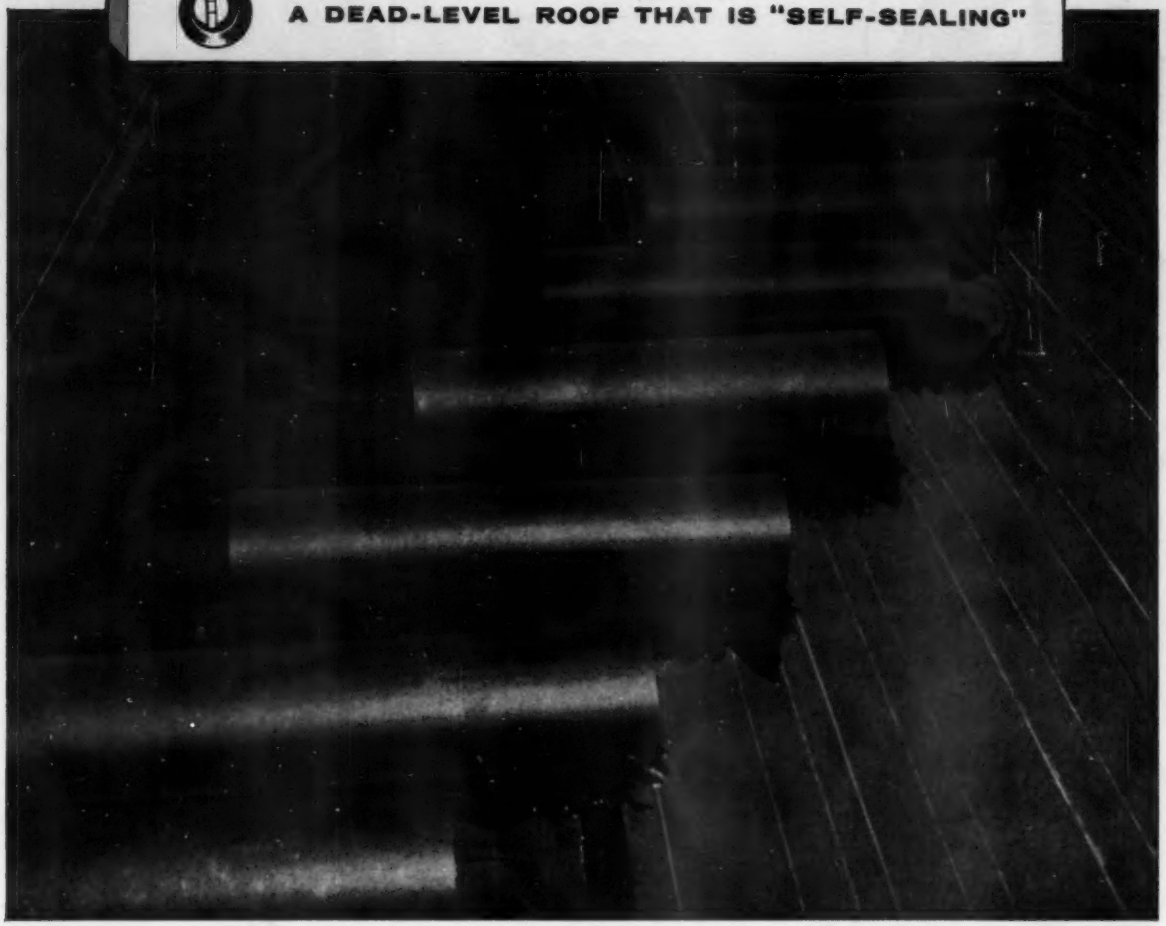

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Built with a bitumen that means better application—longer life

AQUADAM IS A SUPERIOR CEMENTING AGENT developed by Johns-Manville for dead-level roofs. It combines the best features of coal tar pitch and of asphalt without their weaknesses. It quickly cements and securely seals the felts. And, as years roll on, Aquadam retains its self-sealing properties.

In addition, Aquadam offers these other proven advantages: ability to end "standing water worry"; high resistance to all kinds of weather conditions; "superior bond," because Aquadam spreads, wets and saturates the roofing felts uniformly.

For further information on how Aquadam Built-Up Roofs pay off in longer roof life and maximum protection send for a copy of booklet, "J-M Aquadam Built-Up Roofs." Write to: Johns-Manville, Box 158, New York 16, New York. In Canada, write Port Credit, Ontario.

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It's a self-dumping hopper made for fast, efficient handling of wet or dry, hot or cold bulk materials, such as:

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They're strong . . . husky . . . made of 3/16" steel plate with continuous arc-welded seams. Also available in stainless steel or galvanized. Made in five sizes, ½ to 2 yard capacities, with live skids or a choice of wheels.

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1413 Woodland Ave., Detroit 11, Michigan

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DATA FILE

(Begins on page 256)

380 For High Voltage Cable—Test results and service records on an improved butyl rubber compound for high-voltage cables are announced in 12-pp Bulletin EB-27. Covers resistance to ozone, operating temperature, high-voltage, dielectric strength, aging, insulating resistance, absorption. Anaconda Wire & Cable Co.

382 Wiring Devices—Catalog 60, about 80-pp, presents ordering data on wiring devices including a wide range of switches, convenience outlets, lampholders, fluorescent devices, cord connectors, adapters, wall plates, accessories etc. Fully illustrated with photos, catalog provides condensed information on features, dimensions, applications. Pass & Seymour, Inc.

383 Cable Troughs—This 12-pp catalog offers a simple solution to any design problem of change of direction or elevation with a complete set of standard fittings, horizontal elbows, inside and outside vertical elbows, ties, crosses, covers and many special devices. The Globe Co.

385 Flexible Electric Conduit—Performance and application data on company's line of flexible plastic covered electrical conduit, Liquatite, are featured in this illustrated brochure. Electri-Flex Co.

387 Control Batteries—Bulletin CP-540 describes features and advantages of a line of batteries for control, switchgear and auxiliary power. Engineering details and specifications are tabulated. C & D Batteries, Inc.

389 Commutator Maintenance—This commutator and slip ring maintenance data file contains information on methods and procedures for more efficient commutation. Individual bulletins cover brushes, sparking, picking, dragging and other troubles, maintenance tools and how to use them. Ideal Industries, Inc.

390 Renewable Fuses—Features of company's renewable fuses designed to withstand the effects of many "blows" and renewable many times are detailed in 12-pp Bulletin 1320. Ferrule-type, knife-blade type and renewal links are covered, and complete specifications, current time curves included. Economy Div., Federal Pacific Electric Co.

PACKINGS, SEALS

392 Mechanical Seals—Precision mechanical seals for almost every rotating shaft sealing problem are described in this bulletin. Design features are illustrated with cutaway views. Borg-Warner Corp.

393 Self-Lubricating Packings—Featured in this 30-pp Bulletin PC-103 is detailed information on com-

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PREMIUM QUALITY
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Now—it costs you no more for Palmetto Packings than others of lesser quality. Get the perfect combination of price and quality from your authorized Palmetto distributor. For the name of the supplier nearest you refer to our insert in Thomas' Register—"Packing Section".

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Better PIPE TOOLS

CHAIN TONGS

"Reversible", "Standard" and "Ideal" types, in all sizes. *Jaws* are drop forged from special steel, are carefully milled, heat treated, hardened and tested. The *Handles* are forged spring steel. The *Chains* are proof-tested to ⅔ catalog strength (1,200 lb. to 40,000 lb.). "Reversible" Jaws give double jaw life. "Standard" jaws have extra bearing on the handle and forged-in chain guides. The "Ideal" Tongs have V shaped teeth for a sure grip on irregular shapes—fittings, etc.

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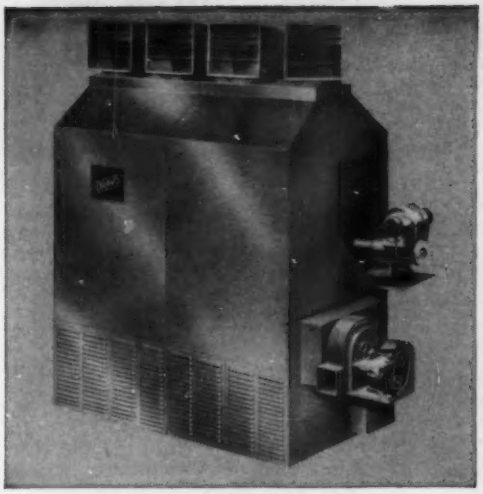
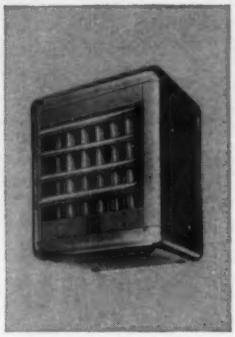


Dravo *Industrial* heater



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Dravo's full line of heaters is backed by a highly trained and extensive service organization, with a reputation for dependability and thoroughness.

This is only one of the "extras" that benefit Dravo customers. The performance built into every Dravo heater is applied so that each installation functions with maximum efficiency. This is only possible because *every* Dravo technical representative *is a qualified heating engineer.*

Complete research and laboratory facilities conduct continuous studies of heater design problems. With the experience gained from over 10,000 installations, these studies result in basic improvements in all phases of both heater engineering and its application to unusual heating problems.

Make sure you get "ALL 4" when you are buying space heating. Only Dravo has the manpower, the technical background, and the facilities to assure your getting the most for your money. Write Dravo Corporation, Pittsburgh 22, Pennsylvania.

DRAVO
CORPORATION

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DATA FILE

(Begins on page 256)

pany's line of packings with internal lubrication. Application chart, table of physical properties, and ordering instructions. Greene, Tweed & Co.

394 Metal Packing—Featured in 24-pp Form AD-166 is detailed information on selection of metal packings for use wherever gas or air is compressed or expanded. Covers free-floating metal packings, metal rod packing rings, metal scraper rings, metallic or non-floating packings, rings. The Garlock Packing Co.

395 Teflon Packings—Bulletins CP 552, 553 and 554 features a variety of different Teflon packings, including ring packings for acids and strong chemicals, Teflon-jacketed gaskets, and packings for the process industries. Installation details are included, as well as design and construction data and molded Teflon properties. Chemical & Power Products, Inc.

PUMPS, COMPRESSORS

396 Continuous Flow Pump—Bulletin 30-C, 8-pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, specifications. Robbins & Myers, Inc.

397 Centrifugal Pumps—Catalog A-156 describes and illustrates company's line of double-suction single-stage centrifugal pumps. Features are detailed, and cross section drawing and construction details are included. C. H. Wheeler Mfg. Co.

398 Rotary Pumps—The positive displacement principle upon which these rotary pumps operate is illustrated and described in 34-pp Bulletin Section K. Discusses rotary pump fundamentals and includes detailed engineering data and selection tables. Viking Pump Co.

399 Centrifugal Pumps—Advantages of cradle-mounted centrifugal pumps are detailed in 20-pp Form 7223-B. A cutaway view illustrates performance features and tables list dimensions and specifications. Cameron Pump Div., Ingersoll-Rand Co.

401 Rotary Blowers, Pumps—Full details on continuous-service rotary positive pressure blowers, gas and vacuum pumps are included in 20-pp Bulletin S65C. Contains photos and cut-away drawings, showing construction features, as well as explanation of operating principles and a list of applications. Sutorbilt Corp.

402 Oil-Free Compressors—Heavy-duty industrial oil-free compressors are featured in 12-pp Bulletin A-44. Component parts are illustrated and described, and internal construction is shown on cutaway. Joy Mfg. Co.

403 Oil-Free Compressors—Described in Bulletin 202-B is a line of compressors designed to compress air or gas entirely free of any oil or oily vapors due to lubricants. A large cutaway view illustrates compenent features. Pennsylvania Pump and Compressor Co.

404 Water-Cooled Compressors—Featured in 12-pp Bulletin WB10 are two-stage water-cooled air compressors designed to meet the demand for small machines having efficiencies comparable to those of large two-stage horizontal compressors. Cutaway views showing component features are included, as well as general data tables. Gardner-Denver Co.

405 Stationary Compressors—Six teen-pp Catalog 5910 describes features and advantages of a line of stationary air compressors designed for a variety of industrial needs. Tables of weights, code words, and dimensions are included, as well as schematic diagrams, cutaway views showing design details, and other data. Schramm, Inc.

SAFETY, SANITATION

406 Fire Extinguishers—This 6-pp brochure describes portable fire extinguishers and accessories. Among the types described are carbon di-

Quality cans
EAGLE SAFETY CANS

The approved *safe* way to handle flammable liquids • Listed by Underwriters Laboratories • Approved by Factory Mutual • Uncommonly rugged for hard use • 'The Complete Line'

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STORAGE CAN
1 qt., 2 qt., 1 gal. sizes with trigger-grip handle . . . 2½ gal., 5 gal. sizes with free-swing handle . . . valve operated by handle gives positive pouring control . . . no waste, no splash, no spill . . . strong quality construction.

ORDER FROM YOUR SUPPLIER

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2½ gal., 5 gal. sizes with free-swing handle . . . flexible spout for easy pouring . . . body and breast each seamless drawn from heavy 24-gauge steel . . . steel hoop reinforces bottom . . . fire screens in pour spout and filler opening for double fire protection.

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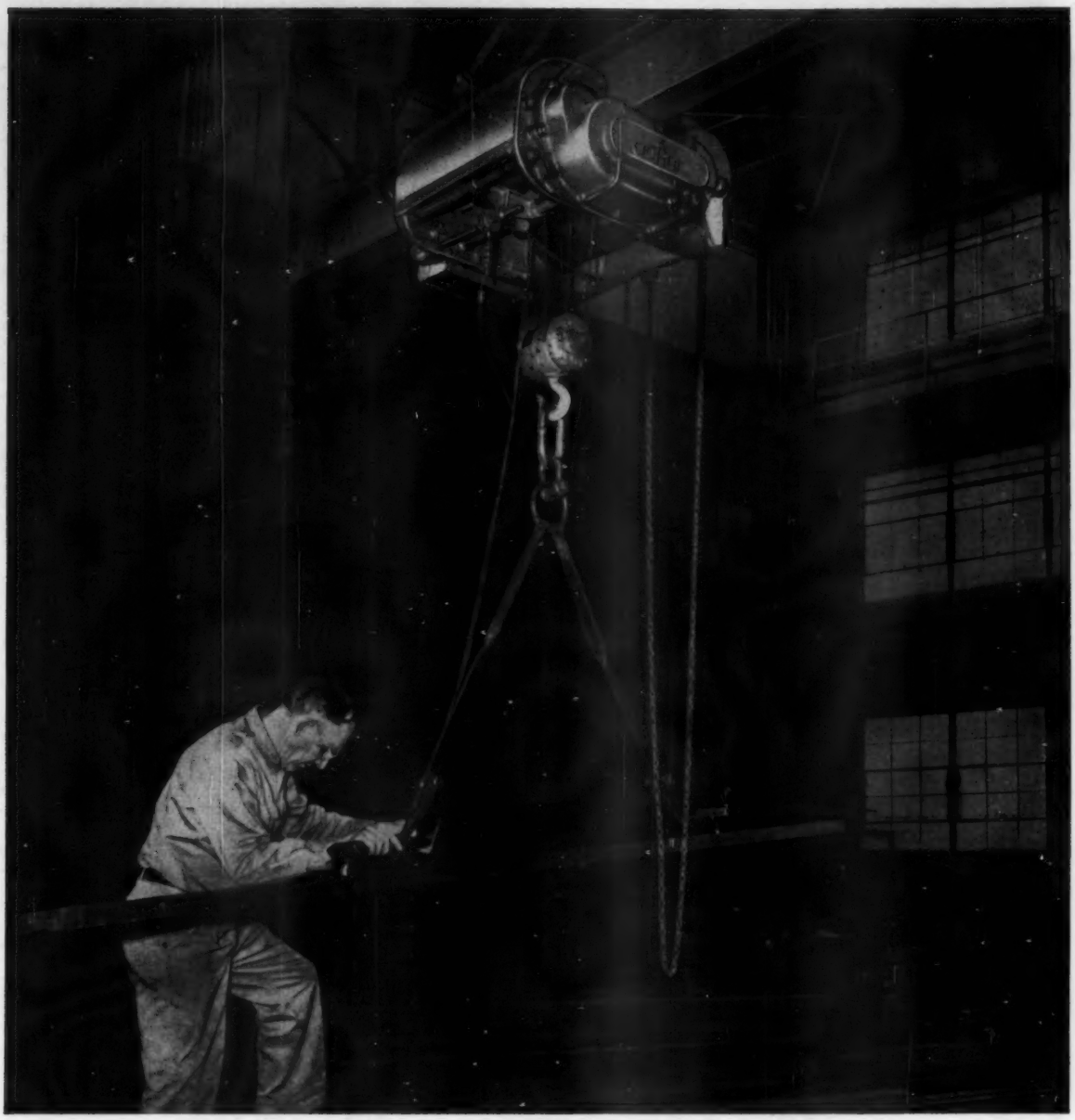

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LO-HED® PERFORMANCE COMES BEFORE PRICE.

When you hit the *really* tough aerial handling problems . . . in places where production flow depends upon continuous hoist performance, and hoist down-time means lost production . . . you need the extra margin of heavy duty performance that only an AE LO-HED hoist can give. Or when you bump into tough headroom problems, LO-HED hoists give you extra feet of lifting height . . . lift loads closer to the ceiling—give you maximum use of every cubic foot in the hoisting area.

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For complete information and specifications, refer to Sweets Plant Engineering File 1a/Ae, or write for your copy of our new catalog H-59. AMERICAN ENGINEERING COMPANY, Dept. H-164, Philadelphia 37, Penna.

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Hele-Shaw and Hydramite Pumps • Lo-Hed Hoists • Vibra-Grate, Perfect Spread and Taylor Stokers

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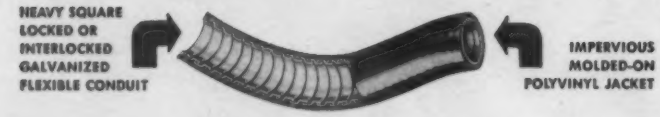

Liquatite insures against costly down time due to wiring failure. It protects against contamination, vibration, motion and shock; proves ideal for "wet locations," around corrosives or where severe punishment may cause shorts or burn-outs.

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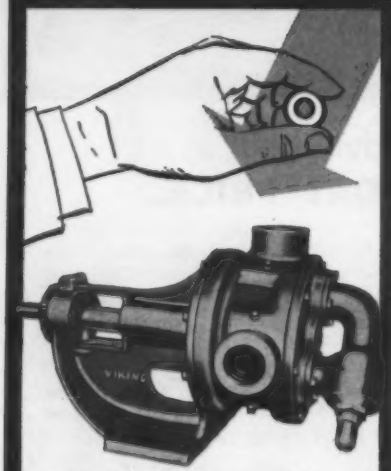
VIKING PUMPS WITH CERAMIC BEARINGS AND MECHANICAL SEALS



After years of experimenting and testing, Viking has developed this new pump that assures you double to triple life, while pumping paints, inks and other *abrasive liquids. Among its features are special ceramic bearings and mechanical seals. Designed for heavy duty, these pumps handle liquids from a minimum viscosity of 100 S.S.U. to heaviest viscous types.

G.P.M. SIZES 3 - 6 - 12 - 16 - 25 - 40

When writing for information, please give:

- Liquid to be pumped
- Viscosity of liquid (S.S.U.)
- Percentage and type of solids present in liquid
- Temperature of liquid
- Specific gravity
- Capacity of pump
- Suction lift or head
- Discharge pressure

And ask for bulletin SP-507Z

VIKING PUMP CO.

Cedar Falls, Iowa, U.S.A.

In Canada, it's "ROTO-KING" Pumps

See Our Catalog in Sweet's Plant Engineer's File

*Consult factory for recommendations for pumping abrasive liquids other than paints and inks.

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DATA FILE

(Begins on page 256)

oxide, dry chemical, soda-acid, foam, vaporizing liquid, pressurized water and anti-freeze extinguishers and wheeled engine units. American La-France Corp.

407 **Protective Clothing** — Catalog 12000, 12 pp, describes and illustrates company's line of industrial clothing for protection against water, fire, acids and alkalis, slipping and scuffing. Various types of work gloves, suits, and coats featured. The B. F. Goodrich Co.

INSTRUMENTS, CONTROLS

409 **Precision Instruments**—Catalog G1 contains 32-pp of comprehensive information on indicating, recording and controlling instruments. Contains potentiometers, pyrometer supplies, descriptive and illustrative data on systems and components, null indicators, amplifiers and oscillographs, pressure gages, flow and liquid level meters, pneumatic remote transmission, thermometers, panelboards, valves, diaphragm motors, motor and dampers, switches, etc. Minneapolis-Honeywell Regulator Co.

411 **Control Pilot**—Bulletin 583 describes characteristics of a liquid level control pilot which uses a fixed metering orifice to restrict the air supply. A schematic sectional view illustrates operation. Leslie Co.

412 **Indicating Flow Meters**—This catalog combines all basic information on company's flow meters, flow switches, and manometers. Covers material composition of components, design charactertistics, mounting methods, scales, maximum application temperatures and pressures, direction of flow, pipe connection locations, and other data necessary for installation and operation of flow meters. Seico Instrument Div., Eclipse Fuel Engineering Co.

413 **Mercury Bulb Elements**—Bulletin 851 describes the various types of mercury bulb elements which are the heart of all company's instruments. Basic principles, type and temperature ranges, plungers and interchangeability, element plunger types and other data are covered. The Partlow Corp.

414 **For Limited Panel Space** — Bulletin 532 describes Model 216 indicator used with company's automatic tank contents gage. Bulletin contains a full illustration of indicator which, although occupying a small space, has a scale 20 in. long. The Liquidometer Co.

416 **Graphic Instruments**—How to make plant surveys with graphic instruments is the subject of 8-pp Bulletin 856. Advantages of systematic surveys with electrical recording instruments are detailed, types of in-

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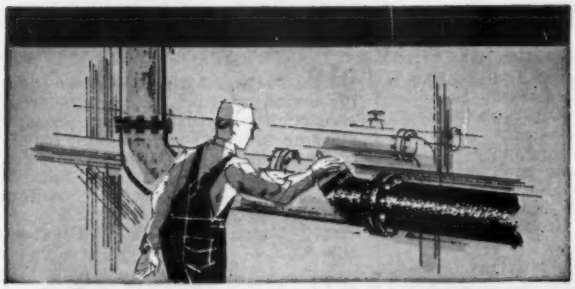
Industrial plants know Mortell products offer more positive protection than any other drip-and-rust preventive. Maintenance men know that paints or compounds of paint and fish oil provide little or no permanent protection. Rust-inhibiting NoDrip Plastic Coating is a moisture-proof insulation that *does* stop condensation . . . forms a seamless jacket . . . *does* stop corrosion. NoDrip Tape, with its triple insulating barrier, is equally dependable.



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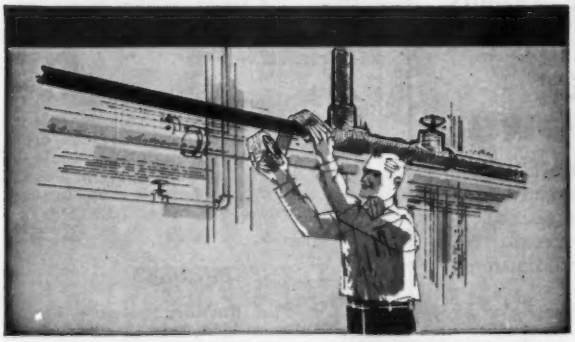
The heavy consistency of NoDrip outlasts many coats of paint or ordinary rust-preventives. Permanently insulates and protects. Applies easily with trowel, brush or special spray. Non-toxic, odorless and non-flammable. Resists acid, alkali, brine solutions or vapors. Available in 1, 5 and 55 gallon drums.



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An easy-to-use, wrap-around pipe covering, perfectly pliable, cork-filled, completely self-adhering. Forms an air-tight, 100% vapor- and moisture-proof jacket. Fits snugly even around tees, unions, angles, valves. Cuts maintenance costs—makes out-of-the-way storage areas useable—ends slip and slide floor hazards. No need for vapor seals, brads, fasteners or tools of any kind.

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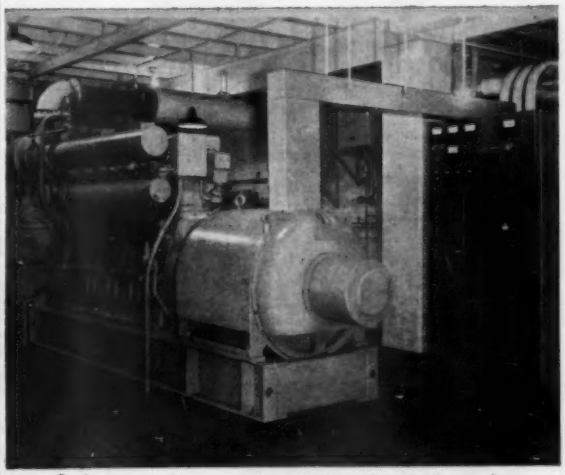

Typical high speed unit with control.

*IDEAL high-speed generators and control equipment pictured above are typical of installations in hundreds of America's leading industrial plants, public utilities and commercial buildings. Custom-designed for longer life with proven efficiency and economy, IDEAL equipment is backed by over a half-century of creative electrical engineering and careful, conscientious workmanship. Unified responsibility for generating units and controls assures you of *better* products *better built* for dependable service with lower operating and maintenance costs. Why not check with IDEAL on your next power application problem?

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318 East First St. Mansfield, Ohio

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OF THESE BROOK A.C. MOTORS

THE Open Drip Proof NEMA Rerate Motor occupies less space—weighs 12 to 15% less than the Open Drip Proof Motor in the old frame. This is no case of "Riding horse versus draft horse"—both motors have equal stamina. Some prefer the old frames, especially where space is no factor. Brook warehouses coast-to-coast carry both types in stock. You can't find a better motor at any price, yet Brook Motors cost substantially less, because of volume production, modern techniques, world-wide distribution and a realistic pricing policy. Brook Motors available from 1 to 600 H.P. All standard enclosures. Write for literature and name of your Brook Dealer.

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SEE FOR YOURSELF the efficient performance of Dustex on your job, at no obligation. Write today for Dustex Bulletin "A Simplified Determination Test."

*Contractors: STONE AND WEBSTER ENGINEERING CORP.

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DATA FILE

(Begins on page 256)

struments needed are described, and studies to be made are outlined. The Esterline-Angus Co., Inc.

417 Crane Control—Bulletin 9100 contains 20 pp of selection and application information on a crane control for hoist, bridge and trolley service. Performance curves, schematic diagrams, dimensional data, reference tables and suggested specifications are included, as well as photos of typical equipment installations. The Clark Controller Co.

BOILERS AND GENERATORS

419 Packaged Boilers—A complete discussion of firetube boilers—from construction features to final test and start-up service—is presented in 12-pp Bulletin Form AD 178. Full-color cutaway drawings illustrate features and design of packaged boilers through 600 hp for heating and processing, steam or hot water. Cleaver-Brooks Co.

421 Steam Generators—Design and construction details on a packaged unit steam generator are presented in 10-pp Bulletin PSG-3. Fabrication procedures are illustrated and capacities, dimensions and weights tabulated. Henry Vogt Machine Co.

422 Package Steam Generator — This illustrated folder describes in detail features and advantages of company's line of package steam generators. Specifications are included. Cyclotherm Div., National-U.S. Radiator Corp.

423 Generators, Auxiliaries — 20-pp Catalog SB 60, on steam generators and allied equipment provides cross section views of major products to show design and construction. Standard and special boilers are included, also burners. Erie City Iron Works.

BURNERS

424 Fuel Burning System — Eight-pp Bulletin 1255 lists 11 sizes of oil, gas and combination gas and oil burners for firing boilers or other heat exchange equipment. Cutaway views in full color show operating principles. Typical burner arrangements and some installations are also pictured. Orr & Sembower, Inc.

425 Heavy Oil Burners—Illustrated and described in 8-pp Bulletin 1-50M-558 is a line of oil burners engineered to make use of low-cost, high-heat content heavy fuel oils. Advantages and typical applications detailed. Industrial Combustion Inc.

VALVES, TRAPS, PIPING AND FITTINGS

426 Stainless Steel Valves—Corrosion resistant stainless steel valves

More capacity... size for size!

Crosby-Laughlin Load-Rated* Shackles

Designed to new safety standards

- **Heat treated alloy pins**
- **Guaranteed capacity**
- **50% stronger than ordinary shackles**
- **Safe working load forged in every shackle**

Stocked and sold by leading mill supply, construction and industrial equipment distributors.

Write for FREE specifications catalog listing the most complete line of drop forged fittings for wire rope and chain.
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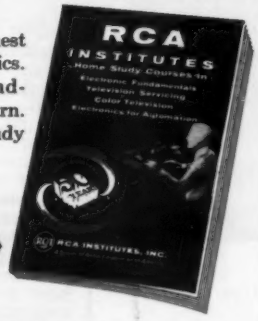

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QUALITY TOOL SERVICE

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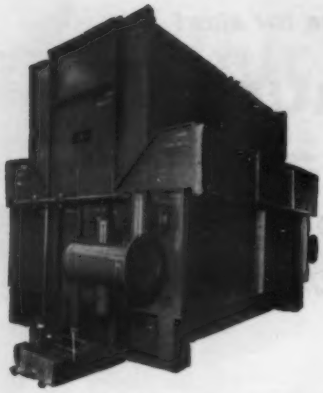
ECONOMICAL COOLING OF GASES AND COMPRESSED AIR



Cooling gases or cooling and removing moisture from compressed air, the Niagara *Aero* After Cooler offers the most economical and trustworthy method. Cooling by evaporation in a closed system, it brings the gas or compressed air to a point below the ambient temperature, effectively preventing further condensation of moisture in the air lines. It is a self-contained system, independent of any large cooling water supply, solving the problems of water supply and disposal.

Cooling-water savings and power-cost savings in operation return your equipment costs in less than two years. New sectional design reduces the first cost, saves you much money in freight, installation labor and upkeep. Niagara *Aero* After Cooler systems have proven most successful in large plant power and process installations and in air and gas liquefaction applications.

Write for Descriptive Bulletin 130.

NIAGARA BLOWER COMPANY

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Niagara District Engineers in Principal Cities of U. S. and Canada

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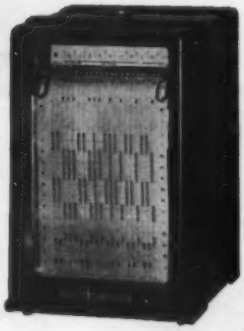
ESTERLINE-ANGUS
OPERATION RECORDERS
Will Show You Why



20 Pens in a single recorder will monitor 20 machines or events. Available for

DC: 2-250 Volts

AC: 6-240 Volts

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Product Representatives in Most Principal Cities

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Pioneers in the Manufacture of Graphic Instruments
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DATA FILE

(Begins on page 256)

are featured in 32-pp Catalog 59SS. Features of design and construction are shown through cutaway views, and advantages of stainless steel in withstanding corrosive attack of chemicals and atmospheres are detailed. Jenkins Bros.

427 Diaphragm Valves—Six-pp Bulletin 115 contains suggestions to be considered when selecting valves for process piping systems. Advantages of diaphragm valves and their ability to meet pipe specifications are also covered, and typical process applications shown. Hills-McCanna.

428 Corrosion-Resistant Valves—Featured in 24-pp Catalog 425 are stock, wedge gate, check, throttle and digester cap valves made of corrosion-resistant materials. Includes tables giving critical dimensions and material specifications. W. G. Rovang and Associates, Inc.

430 Combination Valves—Described in this 16-pp Bulletin CPV-560 are combination silent check valves and combination pump valves for industrial services. Information on materials and features is given, as well as working pressure tables, loss of head-gal per min curves, and other data. Combination Pump Valve Co.

432 Bronze Valves—Circular 602-2 describes the two pressure classes of company's bronze globe valves with Brinalloy seats and discs. Features are described and illustrated through cutaways, and dimensional data listed. The Lunkenheimer Co.

433 Steam Trap Primer—Fundamental facts about drainage and steam trap operation are presented in this 16-pp steam trap primer. Operating principles of steam traps are fully detailed, and data on steam trap maintenance and application included, as well as question-and-answer section covering common steam trap problems. Barnes & Jones Inc.

434 Impulse Steam Traps—Bulletin T1744 describes a line of impulse steam traps designed for light condensate load requirements. Operation is detailed, and capacities, dimensions tabulated. Yarnall-Waring Co.

435 On Steam Traps—Catalog K is an enlarged 48-pp manual and steam trap catalog. New material provided includes open float and thermostatic traps, pipe strainer to 6 in. in steel and semi-steel, and helpful steam pipe sizing tables. Discusses fundamentals of good trapping, trap selection, installation, testing, repairs. Armstrong Machine Works.

436 PVC Pipe, Fittings—This 12-pp bulletin contains latest technical information on polyvinyl chloride

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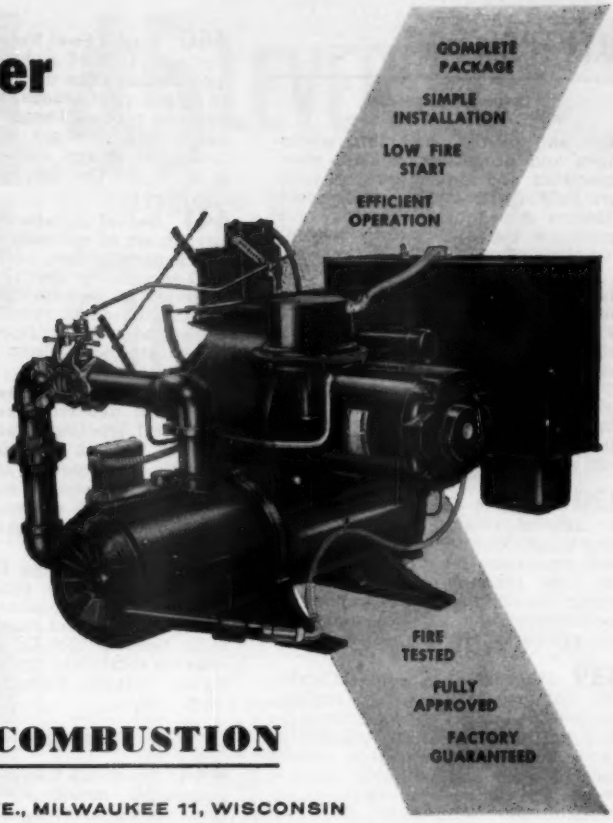

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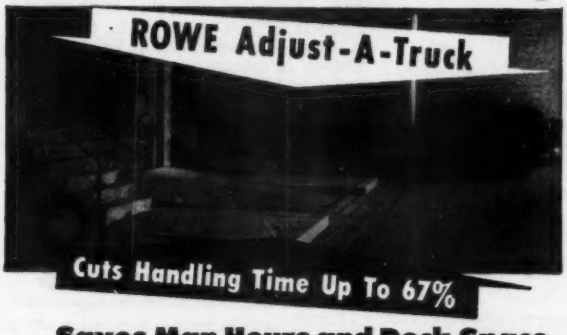

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DATA FILE

(Begins on page 256)

pipe and fittings, including advantages and properties, general characteristics and applications, physical flow rate charts and complete specifications. Also included is a chemical resistance chart of various reagents and their effect. Mueller Brass Co.

437 **Glass Pipe and Fittings**—Corrosion-resistant qualities of this Pyrex brand glass pipe and fiittings which make it suitable for use under corrosive conditions are described in 44-pp Bulletin PE-3. Operating temperatures, physical characteristics, installation procedures are covered and specifications and dimensional drawings given. Corning Glass Works.

438 **Guide to Couplings**—This 26-pp general catalog describes company's quick-connect, quick-disconnect couplings, including a coupling for high pressure applications, for impact in air lines, for low pressure applications, for vacuum and very low pressures, etc. Snap-Tite, Inc.

439 **Fluid Line Coupling**—Catalog 100 contains data sheets describing company's line of quick-connective fluid-line couplings for pneumatic, hydraulic, oxygen, acetylene, steam, various gases and liquids service. Photos and dimensional diagrams are included. The Hansen Mfg. Co.

440 **Forged Steel Unions**—Eight-pp Bulletin U-2-58 provides detailed specification data on all types, sizes, of forged steel unions, materials and pressure ratings. Design and application advantages are discussed and illustrated. Forge and Fittings Div., H. K. Porter Co., Inc.

441 **Swivel Joint**—Features and advantages of company's swivel joint which permits fast, easy packing interchangeability are illustrated and described in Bulletin 1258A. Table of specifications and properties are included, as well as dimensional data and diagrams. Chiksan Co.

442 **Self-Cleaning Strainer**—Bulletin 1210B describes self-cleaning, semi-steel pipeline strainers in sizes from ¼ through 3 in., featuring high strength construction of the bodies, long tapered screen socket, perforated heavy-gage screen. Includes dimensions, weights. Sarco Co., Inc.

443 **Bellows Design Guide**—Twenty-pp Catalog 155 contains helpful information on applications, design considerations, and standards for metallic bellows. Details on using bellows manufactured from various metals are included. Flexonic Corp.

INSULATION

444 **Insulation Coating**—This 32-pp illustrated handbook, Form L-17, presents the advantages of company's No-Drip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster, or composition surfaces. Lists applications. J. W. Mortell Co.

446 **Piping Insulation** — Seven-pp Bulletin SO 1054 features a snap-on, one-piece molded pipe insulation of fine glass fibers for hot or cold piping. Specifications are given for industrial, commercial, and institutional piping. Gustin-Bacon Mfg. Co.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on Pages 251 & 252.

448 **Insulaton Specifications**—This set of six specifications covers applications of Foamglas insulation for industrial equipment and piping. Each booklet contains tables of suggested thickness of insulation to be applied, drawings of installation procedure, supports, and recommended finishes. Booklets are devoted to low-, medium-, high-, and dual-temperature equipment and piping, to underground piping, and spheres. Pittsburgh Corning Corp.

DUST, FUME CONTROL

450 **Dust, Fume Control**—A wide range of industrial dust and fume producing processes that can be successfully controlled with the properly designed cloth or glass bag-type dust collectors is covered in 24-pp Bulletin 562-D. Operating principles are illustrated. Wheelbrator Corp.

451 **Industrial Dust Control** — A wide variety of collection methods for industrial dust control is described in 16-pp Bulletin 922. A typical case history is included as well as photos, cutaway views, drawings and capacity data. Pangborn Corp.

MAINTENANCE

452 **Basic-Roofing Information**—"What You Should Know About Your Roof" is a 40-pp clearly illustrated

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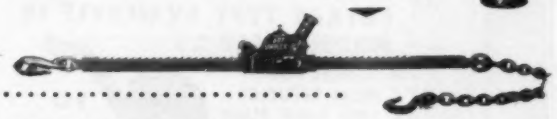

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DATA FILE

(Begins on page 256)

booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses roofing practices. Johns-Manville.

456 For Overhead Maintenance—Bulletin G205RR, 8-pp, tells how to control costs when maintenance goes above arm's reach—for painting and cleaning, electrical work, etc. Pictures a variety of scaffolding arrangements. Provides brief product information on steel and aluminum scaffolding, ladders. The Patent Scaffolding Co., Inc.

458 Cleaning Machines—Pipe and drain cleaning machines and accessories are described in 8-pp Price List 758. Illustrations as well as descriptive details and prices are included. Kollmann Mfg. Co.

HEATERS, HEATING

459 For Radiant Heating—Eight-pp "Radiant Heating Slab Construction" is an illustrated report on accepted installation procedures for radiant heating systems. Arranged in order of preference are sketches of various types of construction. Each shows position of wrought iron pipe coils in the concrete slab, as well as relationship of coils and slab to structural features of on grade and above grade construction. A digest of recommendations reviews floor surfacing, heating slab, radiant heating coils, insulation base or fill, waterproof membrane. A. M. Byers Co.

460 For Heating Systems—A great deal of helpful information on heating systems is presented in Engineering Data Manual 2695, 28 pp. Detailed illustrated information pertaining to heating problems is given. Besides covering heating terminology there are sections on steam data, water properties, piping data, weights and measures and pipe dimensions. Dunham-Bush, Inc.

462 Industrial Heaters—Advantages and features of a line of industrial heaters for space heating, drying, make-up air and oven applications are detailed in this illustrated bulletin. A cutaway view points out features. Lennox Industries, Inc.

463 Electric Heat, 101 Ways—Principal industrial heating applications and methods are described in "101 Ways to Apply Electric Heat," a 32-pp booklet. Illustrated case histories show how metal-sheathed electric heating units are being used. Physical aspects of installation are detailed. Edwin L. Weigand Co.

465 Thermo-Panel Coil—Technical Data Bulletin 355 is a 48-pp guide to company's panel coil for heating and cooling applications. Features of materials and design are illustrated and described, and detailed specification and dimension tables, heat transfer coefficient charts, capacity tables, other data are included. Dean Thermo-Panel Coil Div.

FANS, VENTILATING, AND AIR CONDITIONING

467 Duct Fans—Bulletin A-114A, 12 pp, presents belt-drive fans, from 12 to 60 in., with adjustable driver sheaves which permit quick adjustment of fan speed. Also gives dimensions, performance data and construction details on direct-drive duct fans in the same size range, the Bi-Pass duct fan with the motor mounted in a tunnel out of the air stream, and a reversible duct fan which moves air in either direction. Hartzell Propeller Fan Co.

468 Mechanical Draft Fans—Eight-pp Catalog 1361 describes centrifugal fans designed for handling abrasive gases at elevated temperatures. Complete application, performance and physical data are given, as well as a list of optional accessories. Sturtevant Div., Westinghouse Electric Corp.

469 Air Engineering—Bulletin E-57 is a 24-pp air engineering data file covering engineering and test facilities for propeller fans, specifications, construction, maintenance, and installation. Tables for estimating air-handling requirements are provided. Aerovent Fan Co., Inc.

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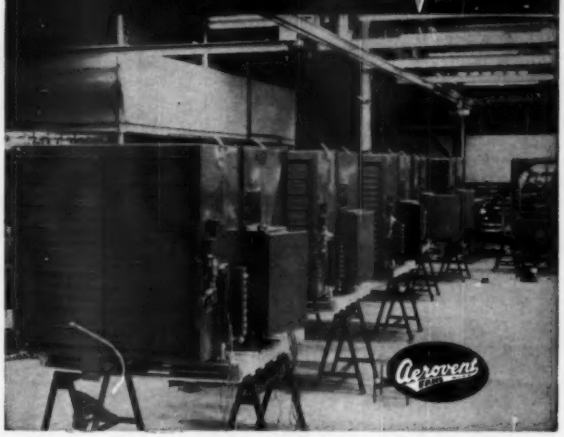

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DATA FILE

(Begins on page 256)

470 **Industrial Diffusers**—Described in 8-pp Catalog F-7722 is a line of industrial diffusers designed for applications where full range air pattern adjustment is essential to human comfort. Complete dimensional data, diagrams and specifications are included. Barber-Colman Co.

471 **Power Exhausters**—Bulletin 58-B contains 12-pp of detailed information on company's line of power exhausters. Construction features are illustrated and described, and performance and dimensional tables are included. Cutaway views and drawings show internal construction features. Jenn-Air Products Co., Inc.

473 **Air Dehumidifier**—Bulletin 140 describes an apparatus using a liquid absorbent for drying air to control its properties for industrial processing and product drying at low temperatures and the air conditioning of spaces for packaging and storage of moisture sensitive materials. Operating and control details illustrated on diagram. The Niagara Blower Co.

474 **Zone Control Cabinets**—Air conditioning zone control cabinets are described and illustrated in 20-pp Bulletin AC-220. Separate sections with tables, curves and sketches cover proper unit selection, physical data, dimensions, fan performance and coil ratings for water cooling, direct expansion, hot water and steam. Buffalo Forge Co.

475 **Duct Systems**—Described in Form 599 is a line of duct systems for power and light and communications wiring. Capacity data is furnished as well as photos of typical installations. The Wiremold Co.

476 **Air Conditioning Units**—Bulletin 786 contains 54 pp of selection data on air conditioners, including capacities, standard arrangements, dimensions, etc. Steps in selection of basic unit and components are outlined. First pages are devoted to choosing the physical size based on air capacity and face velocity requirements, while succeeding pages concern themselves with heating and cooling requirements, control. American Air Filter Co., Inc.

OTHER EQUIPMENT

477 **Fire-Resistant Fluids**—This series of specification sheets describes company's line of fire-resistant fluids, including synthetic, oil-water emulsion, and glycol types. Physical characteristics and other data on each included. Socony Mobil Oil Co., Inc.

479 **Tripod Elevated Tank**—This illustrated bulletin describes the Horton tripod elevated water tank, designed to provide economical gravity water pressure for general service and fire protection in private water systems, others. Standard sizes included. Chicago Bridge & Iron Co.

480 **Preheating Combustion Air**—This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output, ability to use lower grade fuels effectively. Air Preheater Corp.

481 **Product Directory**—This Product Directory G-103 provides a basic source of information on company's divisions and products. Products are divided into major sub-groups—chain link fence, chemicals and coke, springs, belts, wire, wire cloth, etc. The Colorado Fuel and Iron Corp.

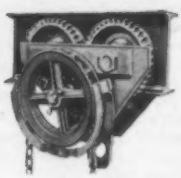
482 **Elastomer Coated Fabrics**—Detailed information on synthetic elastomer coated fabrics is presented in this 12-pp bulletin. Fhysical properties and tests of the various synthetic fabrics, applications and specifications are covered. E. I. du Pont de Nemours & Co., Inc.

483 **Industrial Finishing Equipment**—Catalog A659, 12-pp, describes modern finishing system for cleaning, rust proofing, drying, painting and finish baking. The R. C. Mahon Co.

484 **Plastic Tapes**—Featured in this product bulletin are plastic tapes for

Smooth-Running Timken Roller Bearing Trolleys

Plain Timken Trolley



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WRIGHT Timken Roller Bearing Trolleys (shown), in plain or geared models, provide smooth, safe handling of ¼ ton to 40 ton loads with minimum of effort. Heavy steel side plates and chilled tread wheels revolve on Timken Bearings (two bearings to each wheel). Tapered bearing design absorbs both thrust and radial loads and thereby reduces the work required to move the trolley along I-Beam. Chilled wheel treads wear longer, assure wheel roundness. Wright Self Aligning Roller Bearing Trolleys in ½ ton to 20 ton models are also available.

Write to our York, Pa., office for Bulletin DH-242-B

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a variety of industrial and other applications. Uses described include lane marking, color coding and decorating, holding and protecting, and for masking and protecting. Minnesota Mining and Mfg. Co.

485 To Combat Abrasive Wear—What abrasive wear is, its economic significance, and how to combat it with molybdenum-containing materials are described in this 36-pp bulletin. Describes three general types of abrasive wear—gouging, grinding, and scratching. Selection of material for particular types and conditions of wear is also covered. Climax Molybdenum Co.

486 Reproduction Materials—Photographic papers and films designed for improving drawing and document reproduction are featured in 22-pp Bulletin FI-232. Helpful techniques and economies which these reproduction materials are making possible in drafting room and reproduction department told. Eastman Kodak Co.

487 Silicone Products—The 1959 Reference Guide to company's silicone products tells which silicones can best meet the needs of a variety of problems ranging from adhesives to release agents, resins to rubbers, dielectrics to water repellents. Contains graphic examples of typical applications, as well as detailed selection data. Dow Corning Corp.

488 Paint Finishing—Six articles on factors to consider when planning a paint finishing system are contained in this 24-pp reprint. They cover conveying systems, layout, equipment for metal preparation, ovens, methods of paint application, and auxiliary equipment. Many photos are included, also line drawings illustrating a typical layout and giving details of five stages of metal cleaning and preparation. J. O. Ross Engineering Div., Midland-Ross Corp.

489 Electronics for Automation—Catalog HB-5901 provides 64-pp of information on home study training courses covering electronic fundamentals and electronics for automation. Summarizes lesson material covered and educational objectives. Shows how course presents such subjects as applications of industrial electron tubes, motors and motor controls, power supplies and regulation, sensing and control devices, servomechanism components, recording and readout devices etc. Includes details on handling of assignments and test papers, awarding of certificates, cost of tuition. RCA Institutes, Inc.

490 For Cleaner Furnace—The use and application of Oxi Crystals to keep furnaces and the fireside of boilers free of slag, encrusted carbon, soot and fire-scale is described in a recent pamphlet. Oxi Corp.

491 Coagulant Aids—Featured in this product bulletin is a line of coagulant aids designed to improve floc formation in clarifying and softening water. Advantages are detailed. Calgon Co., Div., Hagan Chemicals & Controls, Inc.

492 Classifying Systems—This bulletin covers major advantages, industrial applications and design features of high efficiency classifying systems for efficient separation or dedusting of dry powdered materials. Includes details on operation, flexibility of arrangement, power requirements, construction. Buell Engineering Co., Inc.

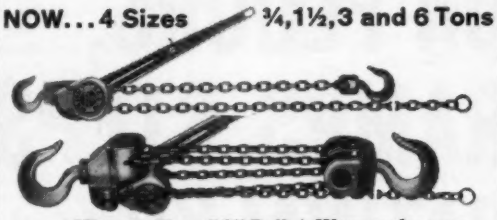
493 Belt Fasteners—Bulletin F-113 details advantages of easy-to-handle economy bulk package containing 25 complete sets of belt fasteners, including bottom plates, top plates, clips, nuts and bolts. Flexible Steel Lacing Co.

494 Industrial Equipment—Featured in this 5-pp Bulletin is a line of equipment manufactured by this company, including such items as air release, can filters, capacitors, circulating lubrication systems, rate of flow controllers, dispensing outfits, filters, indicators, lubricating units, meters, oilers, pumps, valves, and other products. Applications stories are included. Bowser, Inc.

495 Industrial Stack—Detailed information on a permanent, low cost refractory smoke stack for commercial and industrial applications is contained in 8-pp Bulletin IS-32. Gives product information, applications with boilers, furnaces, etc. Van-Packer Co., Div., The Flinkote Co.

New ¾-ton Type "C" Pull-A-Way

NOW... 4 Sizes ¾,1½,3 and 6 Tons



WRIGHT Type "C" Pull-A-Ways make easy work of hundreds of quick hook-up jobs. Now available in four sizes—¾, 1½, 3 and 6 ton—Type "C" Pull-A-Ways are portable, safe and rugged. Corrosion-resistant modern aluminum alloy castings are used for gear case, handle and covers of all models. Hooks, load chain and chain sheave are made of alloy steel. Positive, dependable load brake securely holds load at any point. Lubricated for life. Weights: ¾-ton, 14 lbs; 1½-ton, 23½ lbs; 3-ton, 36½ lbs; 6-ton, 63 lbs.

Write to our York, Pa., office for Bulletin DH-56A

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WRIGHT Safeway Hand Hoists—In 12 Sizes —½ Ton to 50 Tons

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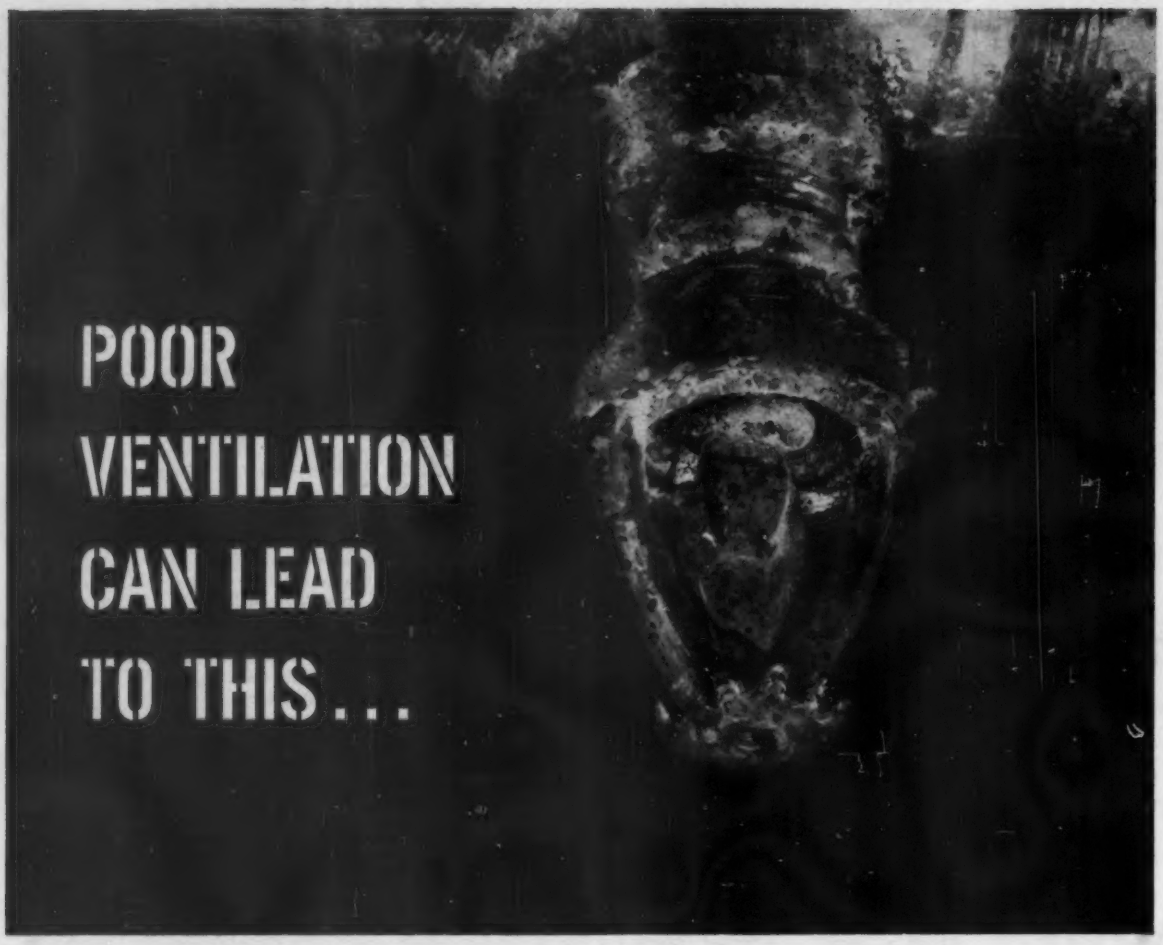

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